Published monthly. Annual subscription: in the United States, $3.00; Canada and Mexico, $4.00; other countries, $5.00. Entered as second-class matter, January 15, 1910, at the Post Office at Philadelphia, Pa., under Act of March 3, 1879. Registered in United States Patent Office. Publication office, 317 N. Broad St., Phila. 7, Pa.

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In this issue . . .

With more and more fertilizer manufacturers going into the pesticide business, it is important that they get off to a good start with the law. After all, there is little point in working hard to turn out a good, effective pesticide if the whole year's production is going to be held up because the labels aren't right. With this idea in mind, and noting a marked increase in the inspection activities of many states, we sent inquiries to state enforcement officials all over the nation. All of these officials were extremely cooperative and struck us as men imbued with a deep-seated desire to help rather than hinder the pesticide industry. A summary of what we found out about pesticide labels and the law begins on page 13.

Anhydrous ammonia delivered from tanks of liquefied gas is gaining favor as a fertilizer in many parts of the nation. One of the major problems that held back the widespread use of this cheap source of nitrogen was the lack of proper application equipment. To solve the problem, the John D. Blue Company of Huntsville, Alabama, got together with one of the nation's top experts, Dr. W. B. Andrews of Mississippi State College and as a result developed their "Nitro-Shooter." The story of this application machine, plus a brief description of the production of anhydrous ammonia and its value as a plant food begins on page 17.

If many of our recently developed pesticides weren't so darn good, there probably wouldn't be very much point in controlling mites with chemicals. Their natural enemies would take care of them for us. But chemical control of many insects who prey on mites allowed mite populations to increase until now they are a definite menace to many crops. To meet this new menace, the Naugatuck Division of the United States Rubber Company developed their new miticide Aramite-15W. Intended for use on non-food crops, Aramite is still in the experimental stage but extensive tests with the material show it to be highly effective. It is now available for limited sale, and US Rubber expects to have the pesticide in large enough production to meet heavy demands this Fall. The story of this new farm chemical begins on page 22 of this issue.

Muckfarming, although a highly specialized operation, offers a ready market for many pesticides. In Michigan—one of the nation's centers of crops produced from muck soils—Dr. Leland G. Merrill, Jr., has done a lot of work on the use of insecticides for muckfarming. We asked him to write a summary of this branch of farm chemicals and his article on the subject starts on page 26.

American Fertilizer & Allied Chemicals

The Magazine of Farm Chemicals

Established 1894

Pioneer Journal of the Farm Chemicals Industry

Vol. 114 **APRIL, 1951** **No. 4**

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Cover Story

When a farm chemicals manufacturer thinks he has a new insecticide, the first thing he has to do is to find out if it is toxic to certain kinds of insects. On our cover this month is a picture taken in the laboratories of the Pennsylvania Salt Company showing how a cockroach is inoculated with a new insecticide for this important first step in a long series of tests that will be made before the company can decide whether or not to market the substance. Although the cockroach is not generally considered a farm pest, its reactions can be used to judge the effect of the chemical on other insects of the same general type.

Photo Courtesy Pennsylvania Salt Co.

Published Monthly by
WARE BROS. COMPANY
317 North Broad Street, Philadelphia 7, Pa.
Telephone MArket 7-3405

A magazine international in scope and circulation and devoted to the farm chemicals industry and its allied trades.

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ANNUAL SUBSCRIPTION RATES

U. S. and its possessions, also Cuba and Panama	$3.00
Canada and Mexico	4.00
Other Foreign Countries	5.00
Single Copy	.25
Back Numbers	.50

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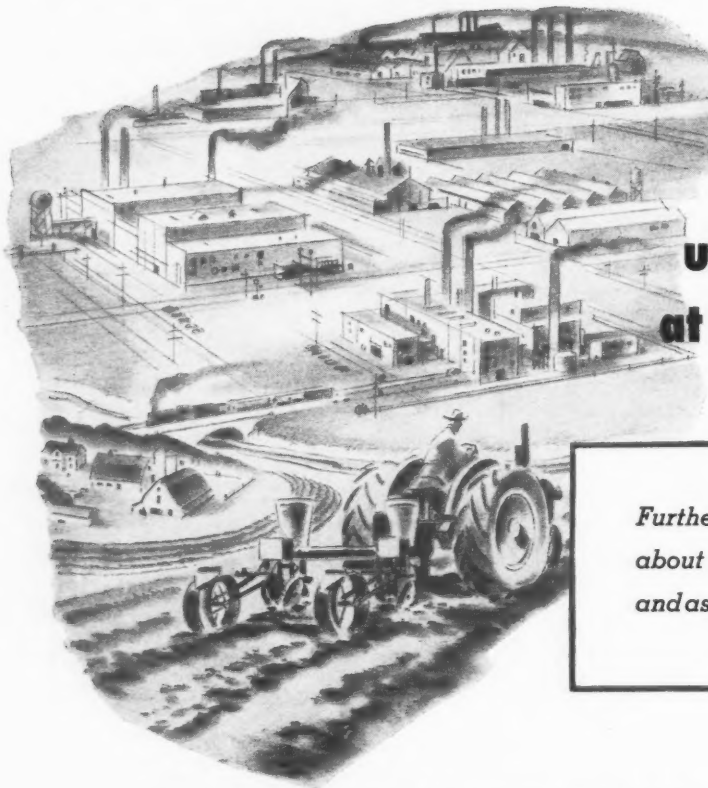

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Trends & Forecasts

An Exclusive and Timely Report from Washington by Fred Bailey & Don Lerch

Washington's cry for the "wanting nail" is being matched by industry's growing search for materials and services to keep products moving to farmers. The resulting crossfire is steadily mounting and many fertilizer and pesticide company executives look for increasing trouble.

Maldistribution of supplies will be especially irritating to USDA officials as they press new programs to step up production. Stunned by reports of planting intentions below requested increases, they are making a determined drive to find "the nail."

USDA officials are in a tough spot in the administration's drive for cheaper food which would be made more difficult by low farm output. Caught in the bewildering complexity of Washington high-level politics, they are expecting industry to come through--and on time. Availability of materials will bolster their pleadings to farmers to plant more this Spring while there is still time.

Industry fat is fast disappearing into factory output. Some "prosperous cousins" are showing thin spots in supplies of various essentials and seem willing to trade off to maintain balance. Others are looking more and more to Washington for supplies to keep going, especially for the 1951-52 season.

Sulphuric acid order, already much delayed, will mark the beginning of an allocation system, but is not the final plan. NPA officials are not staffed to handle even the West Coast phase of the order, whereby after June 1, shipment of acid to the eleven western states would require their authorizarion. Provision for end use certification in the other states is expected to result in more accurate data for NPA study in developing further controls when needed.

NPA is anxious to get more details on possibilities for increased re-use of sulphuric acid. Experts look for a long pull before a satisfactory system will be in operation.

NPA's interpretation of the phrase "essential industry" will be evidenced by the amount of acid made available to agriculture. Manly Fleischmann, NPA Administrator, used the phrase during his appearance before the House Agriculture Committee to express the consideration which would be given by his agency to agricultural needs. Coming after nearly three hours of questioning, the sulphuric acid order is being watched as a signal of where agriculture really stands.

Increased sulphur exports, directly opposite the recommendations made by the House Agriculture Sub-committee, have raised industry's ire. There appears to be no definite U. S. move to encourage Europe to rely more upon pyrites. Company spokesmen say it looks as though the Administration considers European production more important than our own. Apparently we have to be really hurt, before we act, they add.

Appointment of Kenneth Klipstein, top industry official, to post of Deputy Director of NPA's chemical division is considered evidence of industry's willingness to play ball. Klipstein was Assistant General Manager and head of the technical department of the Calco Chemical Division, American Cyanamid Company.

There's some optimism over easing the tank car shortage. Steel is in sight for 850 car volume production beginning this October (according to Defense Transportation officials). Tank cars on order for the chemical industry, including cars for chlorine, anhydrous ammonia, ammonium nitrate, etc., total from 3800 to 4000.

Lead time for construction is increasing, however--that last part is becoming more and more difficult to find.

Shortage of steel containers is expected by authorities to become more acute late this summer. Requests for help are pouring onto the desk of Charles Given, head of the new Containers and Conservation Section of NPA. Given handled similar problems during the last war.

OPS price orders for both the fertilizer and pesticide industry are of the trial and error variety and are not expected to have much effect on the bulk of the spring business. While offering relief for emergency situations some industry leaders hope they can keep its application fairly limited. The order provides that manufacturers and sellers shall compute their margins on a dollar and cents basis for the month of greatest business last year with the privilege of adding current labor and material costs to reach ceiling prices.

Serious business at the Miami playground typifies the National Agricultural Chemical Association's spring meeting. Agriculture Department officials returned to Washington barely in time to polish their testimony for the Delaney Committee hearing.

USDA case before the Committee is founded upon provisions of their Federal Insecticide Act as the basic safeguard for the protection of users and consumers against spray residues. Emphasis is also placed on the vital role of pesticides in the nation's effort to increase food production.

Food and Drug Administration move for greater power over pesticides is given added drive by the introduction of its bill by Representative Miller (R. Nebraska) HR 3257. Miller is a member of the Delaney Committee.

Wave of state pesticide legislation has become the largest in industry history. A vast increase in custom applicator laws is materializing. At least 40 states now have some laws governing sale, labeling, use, or application of materials.

Oklahoma bill authorizing the formulation of pesticides in state prisons has apparently been stopped, but industry's legislative experts are not sure it is killed. If approved, pesticides would be both formulated and sold by the state.

Increased registration fees are proposed in many states calling for payment on each brand sold, with no top limit.

Chemicals for drought resistance are seen as a possible result of fundamental research with various new materials according to Beltsville scientists. Chemicals have been found that make plants hold water longer after they have been treated and harvested, which raises the question of whether chemical means might be perfected to make plants resist drought.

Hormones from plants to stimulate forage growth in pastures and meadows or for increasing yields and protein content of cereal crops is another possibility. Scientists are seeking to identify these hormones with a view toward synthesizing them.

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Sulfur Not Yet All

Pennsylvania Dutch for something that is over, or finished, is to refer to it as "all." Recent news from Washington leads us to believe that many people there would like to have the fertilizer industry think the sulfur situation is a closed issue. That everything is fine, all taken care of, in other words, "all." Well, it ain't.

In a letter dated March 16, 1951, to the Honorable H. D. Cooley, Chairman of the House Committee on Agriculture, Thomas S. Nichols, who is a special assistant to NPA Administrator Manly Fleischmann, wrote in part as follows: "So far as I am aware, the fertilizer industry has not suffered an unreasonable adverse impact as a result of the distribution system that has been followed up to this time."

It seems to us that one of the most valuable contributions made by the Abernathy Committee hearings on fertilizers was to put the spotlight of informed public interest on the dark corners of confusion that still plague much of our defense mobilization effort. However, at this writing, there is little reason to be encouraged. What is needed is a new awareness on the part of officials in NPA and other agencies who have the authority to allocate or "direct" the channeling of critical materials. Nothing we have seen to date indicates the existence of this new awareness.

One of the purposes of the investigation conducted by the Abernathy Committee was to discover whether or not there had been an adverse impact on our industry, and if so, to what extent. As part of this investigation the committee asked for testimony from the American Farm Bureau Federation dealing directly with the situation. Here, briefly extracted from the record, are reports on letters received by the committee from various Farm Bureau Federation members:

Missouri—Telegram from Farm Bureau Federation—"Serious shortage of sulfuric acid reflected by fact few fertilizer manufacturers are in a position to ship superphosphate. Curtailment of TVA civilian production superphosphate increases the problem. Current Missouri fertilizer use totals approximately 400,000 tons annually. Demand will treble next 10 years land-grant college reports."

Michigan—Farm Bureau Services, Inc.—"In 1947 we had a contract with the American Cyanamid Company to supply us with 600 tons per month basis 100 per cent, sulfuric acid 66°. In 1950 this contract was cut to 300 tons per month of like acid. However, we purchased and they delivered, during 1950, 4,505 tons. This year they are only giving us a contract for 200 tons per month and at the same time telling us that it will be needless for us to expect any over the contract.

We are also under contract with the General Chemical Company of Detroit, Mich., for sulfuric acid. They are unable, they say, because of Government directives, to furnish us any acid out of Detroit due to the need of the steel mills in the vicinity. We had a contract with the Detroit Chemical Company for acid for 1950. They are refusing to renew their contract for the same reasons—that the Detroit steel mills are taking all of the acid."

(NOTE: This organization subsequently protested to American Cyanamid the cut-back in their contract and told the supplier that "we are taking steps to call this matter to the attention of persons in authority in the Government. We hope that our allotment will be increased.")

Mississippi—Farm Bureau Federation—"At present we are only obtaining 19 tanks of sulfuric acid per month which is supplied by Consolidated Chemical Industries, Baton Rouge, La. According to the sulfur which they are receiving, we are getting a fair allocation from this company. During last season we received from Tennessee Corp., 40 tanks of sulfuric acid. Up to the present time this year we have been unable to obtain any of this material from them. In addition, we received 37 tanks from American Cyanamid. Their plant has not been operating due to extensive repairs to increase their capacity. They hope to begin operations about the first of March at which time we hope to receive some material from them.

"Prior to December 31, we were supplying three fertilizer plants with all of their superphosphate, and are continuing to supply them as much as possible, however we are only able to supply them about 33⅓ per cent of their requirements, and they are unable to obtain supplies elsewhere."

New York—Farm Bureau Federation—"The 20-per cent cut in sulfur for stock-piling is apparently resulting in a 10-per cent reduction in the amount of phosphate fertilizers which can be delivered in New York State for the fiscal year ending June 30, 1951. The demand for fertilizers is on the increase this year which will cause a very tight situation. No one knows presently what the supplies for phosphate fertilizers may be in the fiscal year beginning July 1, 1951, but it is safe to assume that they will be in shorter supply than in the current year.

California—Farm Bureau Federation—"We require additional 15,000 tons of sulfate of ammonia, 10,000 tons of nitrate of ammonia, 60,000 tons of sulfur for use as soil sulfur, dusting sulfur, sulfur for manufacturing sulfuric acid."

Wisconsin—Farm Bureau Federation—". . . This year our phosphate production was geared to 115,000 tons of 20 per cent superphosphate. Due to shortage of sulfuric acid, our phosphate production this year will be reduced to 74,-500 tons, or a reduction of 35 per cent of just 20 per cent superphosphate. To make matters worse, our shipments of concentrated phosphate from TVA have been reduced 25 per cent."

Indiana—Farm Bureau, Inc.—". . . Ten days ago, we found it necessary to stop shipments of superphosphate to the Kova Fertilizer Co. of Greensburg, Ind. Our superphosphate inventory has been decreased so rapidly that we were required to cut off shipments to the V. W. Norris & Sons Fertilizer Co. of Rushville. This distressed the Norris Co. very much, due to the fact that they had a car of nitrogen solution and no storage, as they used it direct from the rail car. We wish to report this information to you, which points out the seriousness of the sulfuric acid situation."

Illinois—Illinois Agricultural Association—". . . The amount of (*sulfur and sulfuric acid*) needed to meet the annual crop removal needs of P_2O_5 in Illinois is 476,000 tons of sulfuric acid (basis 100 per cent), which in turn requires 158,000 tons of sulfur.

". . . We understand that the over-all supply has thus far been reduced about 15 per cent, but that still further reduction is in prospect. Pressure has been brought to accomplish no reduction among industrial groups, which consume 65 per cent of the total, but to pass 100 per cent of the reduction to the 35 per cent represented by the fertilizer industry."

Iowa—Iowa Plant Food Company—". . . We had to stop shipment on concentrated superphosphate at the end of November with total shipments less than 25 per cent of our normal distribution. Ordinary, single-strength superphosphate has been practically unobtainable since the first of the year. We quit taking orders on January 12 . . .

". . . We do not make our own superphosphate. Our suppliers, Wisconsin Cooperative Farm Plant Foods, Illinois Farm Supply, and Davison Chemical Co., all relate to us difficulties in obtaining sulfuric acid to maintain production programs which would be necessary to fulfill normal contract obligations."

That, briefly, is the picture. Unlike Mr. Nichols, the fertilizer producers and their suppliers seem very much aware of a real "adverse impact" on the industry.

Elsewhere in his letter to the Chairman of the House Agriculture Committee, Mr. Nichols reported that "a meeting of the sulfuric acid Industry Advisory Committee was held March 14 to discuss the necessity for and the provisions of an allocation order for sulfuric acid.

"In accordance with our established practice, a proposed order, when drafted, will be submitted to the NPA Advisory Committee on Priorities Administration for comments and recommendations from other agencies."

From our Washington correspondents we understand that, as of this writing, the order may be out at any moment . . . BUT, it will not be the final plan and will not take effect until June 1, and will apply only to some 11 West Coast states where the need is said to be greatest.

The order probably will allocate sulfur and sulfuric acid only within those 11 states, but anyone shipping into the states will have to abide with allocation order's rules. Shipments elsewhere will be allowed without an order. The order will also require accurate statistical reports to NPA by all producers in the U. S. The order does not become effective until too late to help 1951 crops. It does not relieve the fast productive areas outside of the limited eleven.

One of the biggest difficulties of the order will stem from the fact that there is no staff to handle it, even for the limited West Coast area. In the face of such an order, it may be argued that NPA and other agencies with the authority to allocate materials are aware of the essential nature of agricultural production and agriculture's dependence on industry for that production. Probably, NPA spokesmen would say that the order shows they do recognize that fact, and that they have done everything they can to improve the situation.

Most farm organizations, however, are not convinced that NPA officials are, even now, aware of the essential nature of agriculture. The test of whether or not there is a new awareness on the part of allocations officialdom will lie in the actual results obtained by the limited allocations order.

The issue is far from a satisfactory settlement. The sulfur situation is not yet all.

A. M. BRODINE

* * *

Error Noted by Sympathetic Critic

Other day in the mail, we got a letter from R. C. Ehlers who does sales promotion and advertising for American Agricultural Chemicals. "I question the upper left caption regarding production of 18 per cent APA material last year. Isn't the figure a wee bit low?" We took a second look at the caption, and saw that it read " . . . 1,887 tons." Not only was it a "wee bit low"—it was downright ridiculous. In 1950, the production of normal superphosphate was 10,887,-000 tons, an increase of 379,000 tons over 1949. In a letter to Mr. Ehlers, we explained the chain of events that led up to the error and in response we got another letter from him. "Your explanation of the 18 per cent APA superphosphate caption has a very homelike ring to me. More than once I've had to painfully admit my initials and O. K. were on the final proofs.

"Human nature being what it is, I hope you'll forgive me for taking a little fiendish glee in needling a fellow sufferer caught off base." Shucks, Mr. Ehlers, we don't mind. Always glad to know we've got company.

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Pesticide LABELS and the *Law*

Staff Report by G. P. Teel, Jr.
Assistant Editor, AMERICAN FERTILIZER & ALLIED CHEMICALS

OUT OF 48 states and the territories of Puerto Rico and Hawaii, only 10 do not have separate laws governing the manufacture and sale of "economic poisons" within their boundaries. Of the 10 who don't, most require manufacturers to adhere to federal regulations, which merely means that if the national government doesn't get you, the state will.

Every year, throughout the United States, pesticide manufacturers are caught with their labels down. But this shouldn't be too disheartening, as such regulations work more than one way and in addition to protecting the consumer they are designed to protect you and your product from the competition of inferior materials.

In state legislatures throughout the country, new bills regarding pest control materials are being introduced. Industry is watching these developments closely for, if passed, they will result in increased control over sales and application of pesticides as well as higher registration fees.

Delaney Investigations

On the Washington scene, the House Delaney committee is readying recommendations which are expected to call for a tightening of the existing Federal law and perhaps more stringent regulations. The committee has received increased appropriations amounting to two and one-half times that received in 1950. It is expected that with the $75,000 available, the investigation will be even more thorough than last year.

Correct labeling of pest control materials will increase in importance with the passing of new legislation. If you are in, or are thinking of entering the pesticide field, proceed with your guard up and a label that is correct, down to the last decimal point in the ingredient statement.

Federal Law

The Federal "Insecticide, Fungicide, and Rodenticide Act," requires registration of every product placed in interstate commerce. You must submit a complete copy of the label to be placed on the pesticide container as well as directions for use. In addition, the enforcing agency, the Bureau of Entomology and Plant Quarantine, will need your name, or the registrant, the name of the economic poison involved, and if requested, data on the tests and results used as a basis for your claims.

If the product might do away with the man using the sprayer as well as the grasshopper he hopes to kill, a skull and crossbones must be placed on the package. In addition the word "POISON" printed in red on a highly contrasting background must be displayed in a prominent position on the front of the package. Proper antidotes must also be included.

You might even have to tell the complete formula of your product, but you may be comforted by the fact that the guy who whispers it to one of your competitive friends runs the risks of a fine and 30 days in jail.

For the first mistake you make there might be a thousand dollar fine but with a little care you can avoid such trouble. If it should happen once—don't repeat! Next time you will be liable to a maximum of from one to five years in a Federal "rest camp," in addition to a heavy fine. In legal terminology you would have committed a misdemeanor and would be subject to the penalties of the law regardless of the fact that you have developed the greatest beetle killer of the year.

If the material is adulterated or misbranded, it can be seized. When this happens you might be given a chance to buy it back or it may be condemned and destroyed or sold and released for reworking into legally acceptable material.

The States Differ

So far it's a cinch. A few easy rules and you're in business. But wait a minute, how about those state regulations? It's true that there are ten without any laws, so that once you get by Uncle Sam you are in the clear, so far as those few places are concerned. To get your bug killer into the other 38 states might make you sweat, for what goes in one state, isn't legal in the other, etc., which is probably an old story to fertilizer men.

Labeling can be a real problem. Each state seems to have its own idea as to what should be required and although most agree to some extent you evidently can't get into all states legally using the same label in each.

Ingredient statements vary, but are an absolute necessity in any state having a pesticide law. There are generally three types allowed, the first of which is probably best, for it is legal in most instances.

1. Name and percentage of the active ingredients plus the total percentage of inert ingredients.
2. Name of each active ingredient plus the name and percentage of each, and the total percentage of inert ingredients.
3. Name of each active and inert ingredient plus the total percentage of inert matter.

The first alternative must be used in nearly every state if the product contains materials that are highly toxic to man.

There is one more thing that comes under the heading of an ingredient label, if arsenic is present in any form. The total amount and total water soluble arsenic must be expressed as a percentage of metallic, elemental, arsenic.

Enforcement agencies in most states aren't going to take your word for the product you wish to register. Nor are they apt to leave inspection up to a Federal bureau, unless there is no state law covering pesticides and they have to rely on the Federal regulations.

Chemists will analyze the material, following standardized procedures but all will not inspect in the same way. Some will inspect the sample submitted for registration, others will spot check later, a few do both, and then there is the group that checks a product only on complaint. In any case make sure your product agrees with the label submitted for registration and avoid a charge of misbranding or adulteration.

Who Enforces Law

Various bureaus, departments, and individuals are in charge of inspections for the different states. The state chemist is usually responsible for the sampling but it might be a bureau of chemistry, state entomologist, control supervisor, or even the state board of health. Regardless of who does the work, your label will be checked, so in addition to making the product agree with the label, make the label agree with the material you submitted when registering the stuff to begin with. If this dispersion of responsibility isn't enough to confuse matters, consider those states having no pesticide law.

Regardless of the Federal law there are bound to be some people who will market anything under a label that claims everything. Your only protection against such unscrupulous operators is probably the complaint of a consumer. Even if the state doesn't act upon the complaint, the Federal government will undoubtedly inspect it and remove it from the market if it is shown to be toxic to man.

A local producer, manufacturing and selling his product within the limits of one state, can have a field day if there is no state law. It would seem that he can market anything so long as it doesn't endanger the lives of the population or the crops of the state's farmers. He is able to put out a deficient material, with a powerful label at a bargain price and give you some real competition until he is found out.

What "Misbranding" Is

Misbranding is one of the most common infractions and nearly always involves the label in some way. This charge is brought by most states if:

1. A misleading statement is used on the label.
2. An imitation is used or the product is sold under the name of another chemical.
3. A label bears any reference to the proper registration of the product within the state.
4. There is a lack of instructions necessary for effective use.
5. There is no warning as needed to prevent injury to men or animals.
6. The immediate container, and outside container if used, does not have a clearly read ingredient statement.
7. Use of the material as directed is injurious to men or animals, or to the person applying the chemical.
8. If the chemical is injurious to vegetation other than the weeds to which it is applied.
9. If there is no statement of the inert ingredients.
10. If all of the required matter is not as prominent as any design, statements, or words appearing on the package.

But what happens if, in spite of all the precautions you may have taken, an infraction is noted? A lot could happen, depending on the seriousness of the offense.

If the label lacks the required information, or if the material is adulterated or misbranded, the pesticide might be either put under a stop sale order or seized. The manufacturer is usually given a chance to correct the error by relabeling or reworking the product. In some states it is also necessary to pay the costs involved in the stop sale order and in addition deliver a bond. If this is not done the material may be sold for reworking or condemned and destroyed.

Pull a real boner and you might jump into a peck of trouble. Fines and sometimes jail sentences are as possible under most state laws as they are under the Federal code. Failure to comply with the law is considered a misdemeanor and is punishable by maximum fines of from 25 to 500 dollars for the first offense. With repeated offenses jail sentences up to one year are possible and fines are increased.

What "Adulteration" Is

Adulteration of a product is another charge often brought against a manufacturer. It too involves the label, in as much as the contents do not conform to statements made on the label. This infraction can be avoided if you make sure that:

1. The strength or purity is up to the standard of quality indicated on the label.
2. No substance is substituted for wholly or in part.
3. No valuable constituent is wholly or in part abstracted.
4. No substance is added which would be injurious to the vegetation on which the material is used.

If found guilty of any of these errors you run the risk of the same penalties that are incurred when a product is misbranded.

Most inspection officials will prefer to work with you rather than against you. G. H. Laramie, Control Supervisor of the New Hampshire Department of Agriculture said in response to a questionnaire sent out by AF & AC, "We will work with the idea of cooperation with all manufacturers and will try to help them rather than to penalize if they, in turn, have a spirit of cooperation."

Officials, for the most part, have kind words for producers of pesticides. "We have had very little trouble with manufacturers of economic poisons in this state," reported W. H. Shaw, Supervisor of Horticulture in Washington. "They have cooperated very well and have changed labels whenever we requested them to do so. Also, if they have applied to sell or register chemicals that our law does not allow, the application was withdrawn whenever we requested it."

Now let's see where labels most often come into conflict with the regulations. Aside from forgetting to register, these stickers cause more trouble than most other errors.

One of the most common shortcomings is placing an incorrect net weight or volume figure on the package or in some cases neglecting to put such figure on the label at all. This should provide little trouble, except for the short weight boys. However, inspectors can spot very small errors.

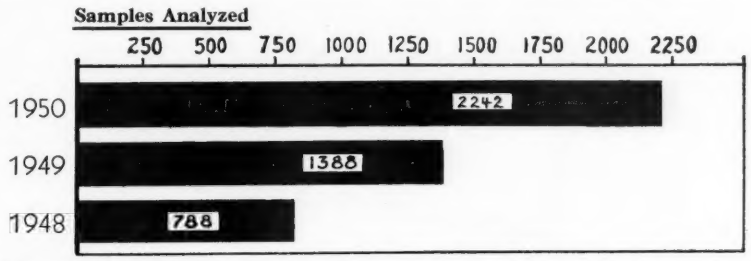
Be careful when compiling the ingredient statement, by making sure that it agrees with the statement you turned in when registering the product. They are supposed to agree, and the grand total of the ingredient percentage should total 100 per cent. It's surprising, but some labels have been found on which the percentages didn't total correctly.

Be sure of the toxicity of the materials you put into the pesticide. If it is supposed to be labeled as a poison toxic to man, be sure that POISON is there in big red letters along with the antidotes and a contrasting background. If it's going to take the hide off some unsuspecting farmer tell him about it, don't make him find it out the hard way.

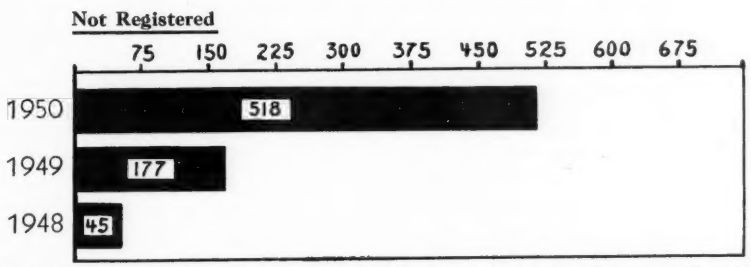
Let people know if it may hurt their livestock *(see page 4)*

PESTICIDE SAMPLING RECORD

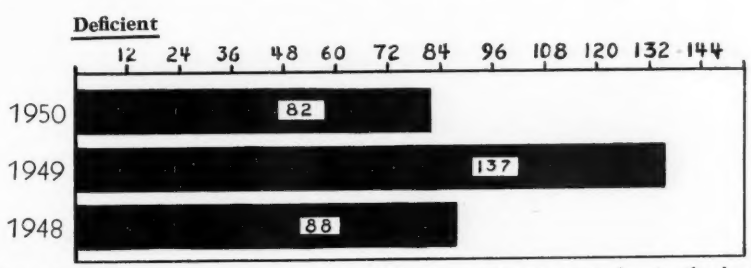
The following charts were compiled from material gathered in an AF & AC survey of state inspection agencies. Records of eight states, those supplying full information for the three periods, are included. Most infractions were not intentional, they represent a lack of understanding of state pesticide laws on the part of the manufacturer.



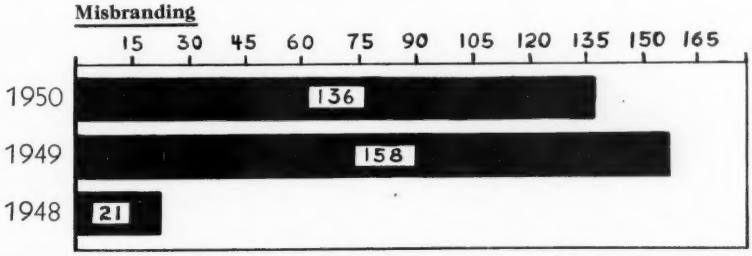
Increasing activity by state inspection agencies is indicated by the greater number of samples taken during the past two years. Now, with state legislatures assigning more funds and workers to pesticide sampling, the number of samples analyzed during this and following years should be greatly increased.



Inability of these agencies to properly check pesticides in the past allowed many unregistered products to reach the market. Now analysts are uncovering such products and enforcing registration procedures. The number found will probably continue to increase until the state machinery is in full operation.



More deficient products have been found in the past two years due to the increased vigilance permitted inspectors. Be sure your product is within the law and that its ingredient percentages agree with those shown on the label.



Many products have been misbranded for some time but were not discovered because of the lack of inspection facilities. To avoid such an infraction you must make every effort to use labels that comply with the law in every detail.

SULPHUR

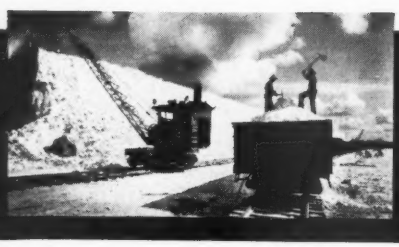
*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*MINING

The process of mining sulphur, as developed by Herman Frasch, takes advantage of the fairly low melting point of sulphur (about 240° Fahrenheit). The process resolves itself into three parts: one, operating a power plant that heats and pumps to the field large quantities of water; two, distributing the hot water through wells to melt the underground sulphur, and raising the melted sulphur to the surface; three, cooling and solidifying the sulphur in large vats from which it is broken and loaded into cars for shipment.

The power plant and water reservoir, as well as the vats and permanent structures, are placed at some distance from the sulphur deposit to avoid possibility of damage from surface subsidence, resulting from extraction of the underground sulphur.

Loading operations at our Newgulf, Texas' mine



TEXAS GULF SULPHUR CO.
INC.

75 East 45th St. New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

Anhydrous ammonia being placed in a fescue field through the John Blue Company applicator and Nitro-Shooter

Photo courtesy John Blue Company

Bottled Fertilizer

No DUST, no caking, no burning of leaves . . . . It all sounds good to agriculturists whose crops and soils have an unending lust for nitrogen. They can obtain all of these advantages by using anhydrous nitrogen, and probably save money doing it.

The first attempt at using straight ammonia as a fertilizer occurred about one hundred years ago in Europe. Aqua ammonia (ammonia and water solution) was used in these early experiments but since the practice did not develop, it is assumed that the available equipment was not suitable.

A decade ago workers at the Mississippi Experiment Station applied anhydrous ammonia in the field. A mule-drawn plow was rigged in such a manner that the gas was released into the soil. During the same period ammonia was being applied to irrigation waters by the Shell Development Company.

In 1944 the Mississippi experimenters, under Dr. W. B. Andrews, really began considering the use of anhydrous ammonia as a source of nitrogen in crop production. At first the big drawback was the lack of suitable equipment for applying the material.

The John Blue Company of Huntsville, Alabama, went to work on the problem in 1948 and developed a metering pump that was demonstrated in the fall of that year. Their product, now being used commercially, assures accurate calibrated amounts applied to the soil regardless of the temperature or tractor speeds.

New Application Machine

Now farmers and fertilizer distributors can obtain field or row type cultivators adaptable to the injection of the material with a supply tank mounted on the tractor or implement frame. The Blue Company "Nitro-Shooter" has been developed as a special tractor drawn anhydrous ammonia machine. According to the manufacturer, one man using a 100-gallon tank and a four-row implement can fertilize from 25 to 50 acres a day applying 40 pounds per acre. This is nearly twice as fast as two men can go using conventional materials and machines.

The ammonia passes through a metering device which regulates the flow of material, through a tube fastened to the back of a cultivator shoe or a specially developed instrument that is similar in appearance. The shoe digs into the soil allowing the gas to be discharged below the surface of the soil where it is locked into place.

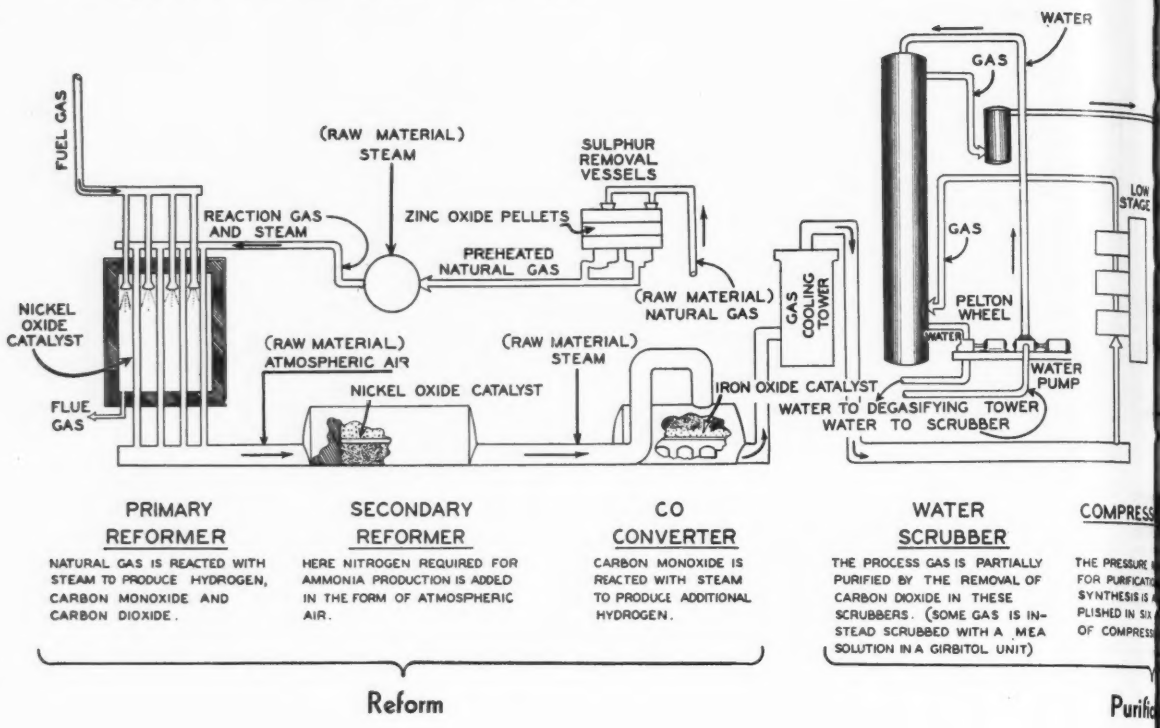
The new fertilizihg method is considered especially good in dry periods when the water necessary to dissolve most fertilizer materials is not available. It is applied deep enough so that the root development extends into zones of higher moisture content enabling the plants to continue growth during drought periods.

The Production Process

In 1948 the Lion Oil Company purchased the former Ozark Ordnance Works in Eldorado, Arkansas. It is now being operated as their chemical plant in which the basic product is anhydrous ammonia. Their production processes are typical of the industry. Three principal steps are involved in production at the Arkansas plant: gas reforming, purification and synthesis.

Basic ingredients in anhydrous ammonia production are natural gas, air and water. In the gas reforming process, nitrogen is extracted from the atmosphere and the hydrogen obtained from natural gas and water to form process gas. Natural gas is not only a manufacturing ingredient but is also used as a source of heat and power for the plant. The process gas coming out of this reform step contains,

How Anhydrous Ammonia is Made



in addition to the required one-to-three ratio of nitrogen to hydrogen, impurities such as carbon dioxide and monoxide. Metallic nickel in the active state and iron oxides are the catalysts used during this step.

The production gas is piped through a 54-inch diameter line to the gas engine building. A large floating-top gas holder "rides" on the line to take care of fluctuations. Despite a 400,000 cubic foot capacity the holder contains only enough gas to operate the synthesis plant at full speed for seven minutes.

In the purification process the carbon dioxide and monoxide are removed in two principal operations each of which has definite heat and pressure requirements. The gas from reform is first compressed to 220 pounds per square inch for removal of the carbon dioxide. This is accomplished by scrubbing the gas either with water in a water scrubbing tower or with monoethanolamine (MEA) solution in a Girbotol unit.

So that the water can be reused it is sent to a degasifying tower where the pressure is released. Here the reaction is reversed and the carbon dioxide vented to the atmosphere. The MEA solution is made ready for reuse by subjecting it to a high temperature in the regenerator where the second reaction is reversed.

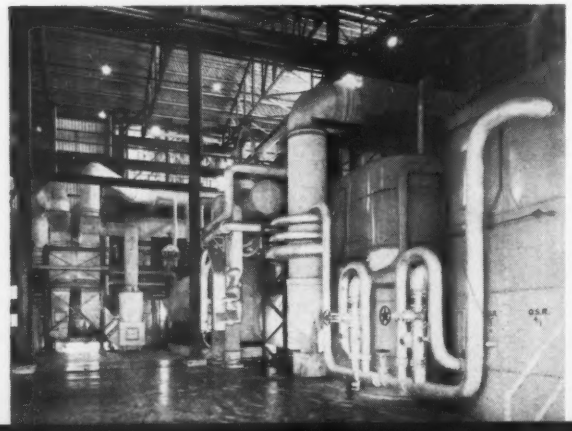
Next the gas is compressed to 1,800 pounds per square inch for removal of the carbon monoxide and any remaining carbon dioxide. This time it is scrubbed with copper liquor (copper-ammonium-formate) and caustic. This reaction takes place at a low temperature. At high temperature and low pressure the reaction is reversed and the copper liquor regenerated for reuse. Spent caustic is discarded and not regenerated.

After purification the gas is compressed to approximately 5,000 pounds per square inch, the pressure required for the final synthesis step in which the hydrogen and nitrogen are made ready to unite to form finished ammonia. This is accomplished at approximately 525 degrees Centigrade and about 5,000 pounds pressure in the presence of a catalyst. The catalyst used is iron oxide of magnetite form promoted with potassium and aluminum oxides. To become active the iron must be reduced to metallic form.

Not all of the gas is reacted on its first pass through the catalyst bed, and must be recirculated through a synthesis loop system. Liquid ammonia is con-

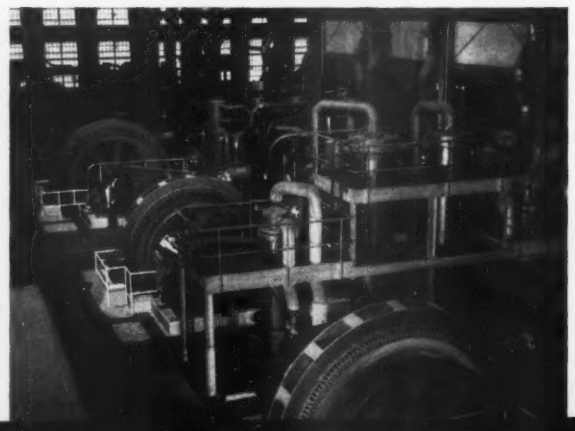
Ammonia production begins in the gas reform plant.

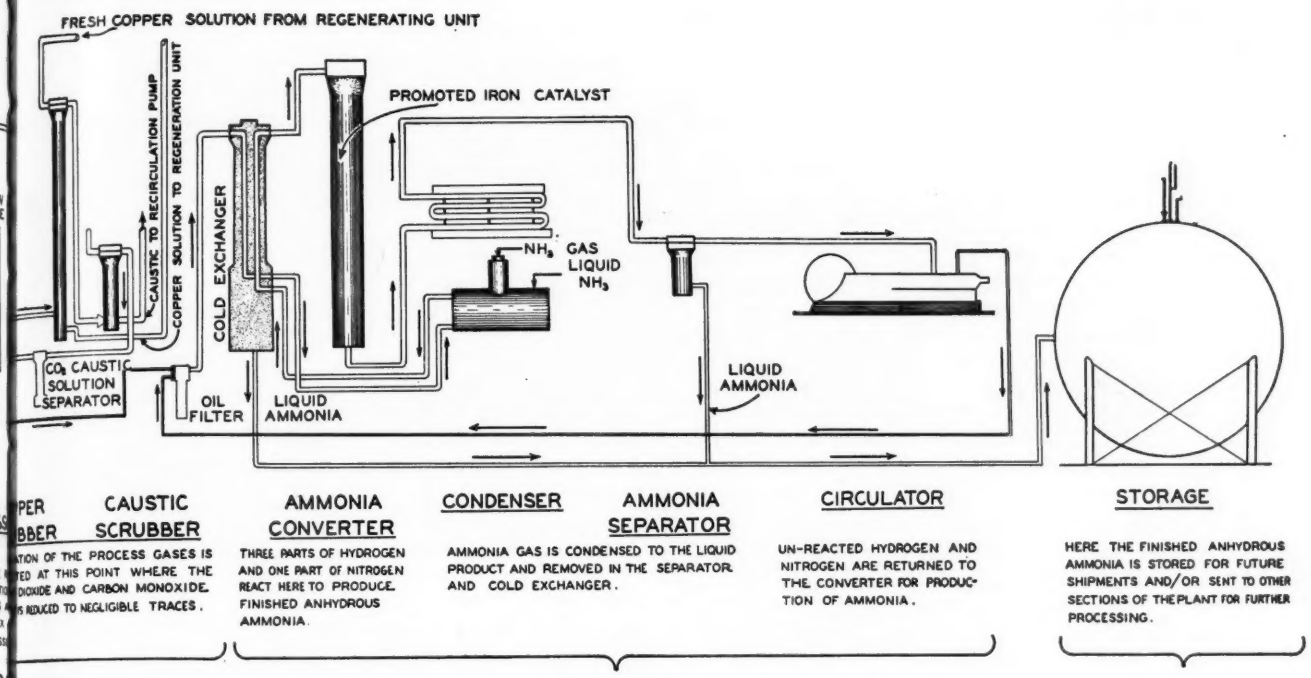
Courtesy of E. I. duPont deNemours Co., Inc.



Compressors build up gas pressure for purification.

Courtesy of Lion Oil Company Chemical Sales Div., El Dorado, Ark.





Flow Chart Courtesy Lion Oil Co.

stantly withdrawn from this system and replaced with new process gas. The finished ammonia is then pumped to the storage section and placed in spheres or loaded directly into tank cars for shipment. At the Lion works some is transferred to other sections of the plant for further processing.

Safety Standards

The American Standards Association has set up a project on storage and handling of anhydrous ammonia and ammonia solutions. The project was recommended at a recent conference, requested by the Compressed Gas Association. Safety standards pertaining to design, construction, location, installation, and operation of anhydrous ammonia systems and transportation and storage of this material and ammonia solutions will be included within the scope of this project. Ammonia manufacturing plants and refrigerating or air conditioning systems will not be considered.

Thirty-two organizations have been invited to participate in the work of the project. Various engineering, trucking, insurance, manufacturing, and governmental groups are included.

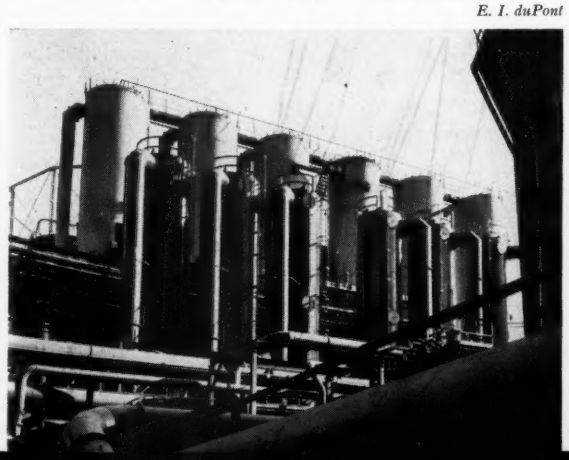
Where the use of anhydrous ammonia is established in a state its storage and handling are controlled by regulations. In Mississippi these regulations are enforced by the State Motor Vehicle Comptroller. The requirements outlined below are for conditions as they exist in Mississippi, where the maximum day temperatures rarely exceed 100 degrees F. The specifications would differ where temperatures are materially higher or lower than in Mississippi.

Anhydrous ammonia has a gauge pressure of 197 pounds per square inch at 100 degrees F., and 215 pounds at 105 degrees F. The maximum day temperatures never go so high as 105 degrees F., and night temperatures are about 15 degrees F. cooler. In 30,000 gallon tanks the temperature of the ammonia does not go so high as maximum day temperatures nor so low as the minimum night temperatures. It appears that the maximum pressure of anhydrous ammonia in 30,000 gallon tanks should never be so high as 215 pounds per square inch. Small tanks may reach a higher pressure. The recommendations are:

1. ASME—API code tanks, 250-pound working pressure, with the pop-off valve set to discharge between 237 and 250 pounds per square inch.

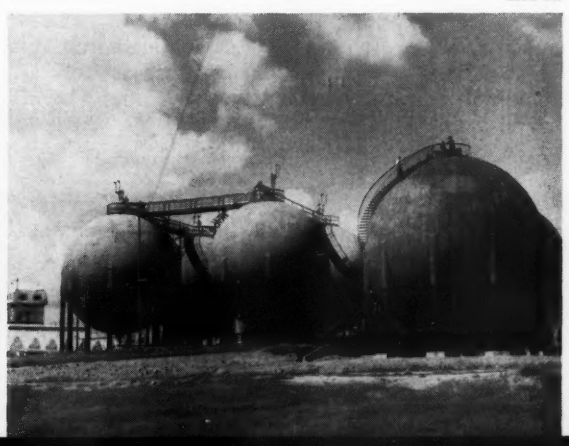
Absorbers and scrubbers purify the process gases.

E. I. duPont



Storage spheres hold 500 to 1,300 tons of ammonia.

Lion Oil



2. Underground tanks for bulk storage of anhydrous ammonia. These tanks are used very little and there are depreciation hazards which are not common to other types of storage.

3. Refrigerated above-ground storage tanks which have a working pressure of less than 250 pounds per square inch are usually limited to Horton spheres which are insulated. However, it is possible that use could be made of some non-insulated lower working pressure tanks for storage of anhydrous ammonia during the winter months, where they are emptied as warmer weather approaches.

Anhydrous ammonia is usually transported in 26-ton tank cars to the local bulk storage plant, where it is transferred into storage. It is usually transported to the farm in 1000-gallon trailer tanks which are taken directly to the field. It is then transferred to tractor tanks holding from 60 to 100 gallons. From these tractor tanks, it is released through a metering device into the soil.

Popping Off Pressures

Popping off of anhydrous ammonia tanks is a loss. If popping off of a 30,000 gallon tank containing 60 tons of anhydrous ammonia lowers the pressure 10 pounds per square inch, over 300 pounds of ammonia is lost, which is a loss of about $20 each time the valve pops off and lowers the pressure 10 pounds. Evidently, provisions must be made to avoid popping off of tanks. It has been reported that some pop-off valves go off at pressures which are much lower than the 237- to 250-pound setting; for this reason Mississippi regulations require sheds, or provisions for sprinkling.

Bulk storage plant operators should keep a close account of the tanks if the pressure exceeds 200 pounds per square inch to determine whether or not the pop-off valves release at lower pressures than they are set for. If they do so, sheds or sprinkling systems should be provided to prevent the loss of ammonia.

The temperature (and pressure) of small tanks is more quickly changed by changes in the atmospheric temperature than that of larger tanks. They are, therefore, more likely to pop off than larger tanks.

In the manufacture, transportation, and application of anhydrous ammonia to the soil, it is handled by pumps or compressors, or transferred by its own pressure by bleeding vapor from the tank being filled.

Tractor tanks are usually filled from 1000-gallon tanks by bleeding off a small amount of vapor from the tractor tank to lower the pressure. So long as the pressure in the tractor tank is maintained at a pressure no lower than 10 pounds per square inch less that in the 1000-gallon tank, the loss of ammonia is no more than one per cent.

An explosion may occur if a spark is lit in an atmosphere containing 16 to 25 per cent anhydrous ammonia, but the material is not considered an explosive. Because of the explosion hazards welding should not be done on tanks containing a mixture of air and ammonia.

Men can be adversely affected by the material. In low concentrations it is very irritating to the nose, eyes, mouth, throat, and lungs. To avoid blistering, water should be available to wash off any ammonia contacting the skin.

Action in Soil

Experimenters have found that 6 inches below the surface of the soil is the best depth to place the material. When applied, it is locked almost immediately in place. Once in the soil, it is turned into other forms of nitrogen by bacterial action.

Ammonia does not leach out of the soil but nitrogen is lost in nitrate form. The rate of change of ammonia to nitrate nitrogen is dependent on the acidity of the soil, its temperature and moisture content. The conversion is most rapid in an alkaline soil at high temperature and moisture levels. In the spring this process usually takes from six to eight weeks.

Since the ammonia does not leach out of the soil immediately, it is available immediately to young plants. These prefer their nitrogen in that form and grow most rapidly when it is available. However, as a rule no difference in yield results. As the ammonia is changed into other forms, especially nitrates, it becomes available to all plants and as such, is important as a side dressing as well as a preplanting application.

Value As A Plant Food

In Mississippi, W. B. Andrews, J. A. Neely, and F. E. Edwards have carried out tests on several crops. Their results represent the latest available data on crop responses to anhydrous ammonia.

When used on cotton, ammonia was shown to be much superior to ammonium nitrate in most tests. This is attributed to the ammonia being placed directly in the root zone where it was available to plants even though little rain fell following the application. Placed on the surface, much of the ammonium nitrate remained there because of insufficient rain to completely carry it to the root zone

Results of the tests emphasized, according to the experimenters, the desirability of applying solid sources of nitrogen directly in the root zone if dry weather is liable to follow application. A difference in the potential efficiency of these nitrogen sources when used as a side dressing was not indicated.

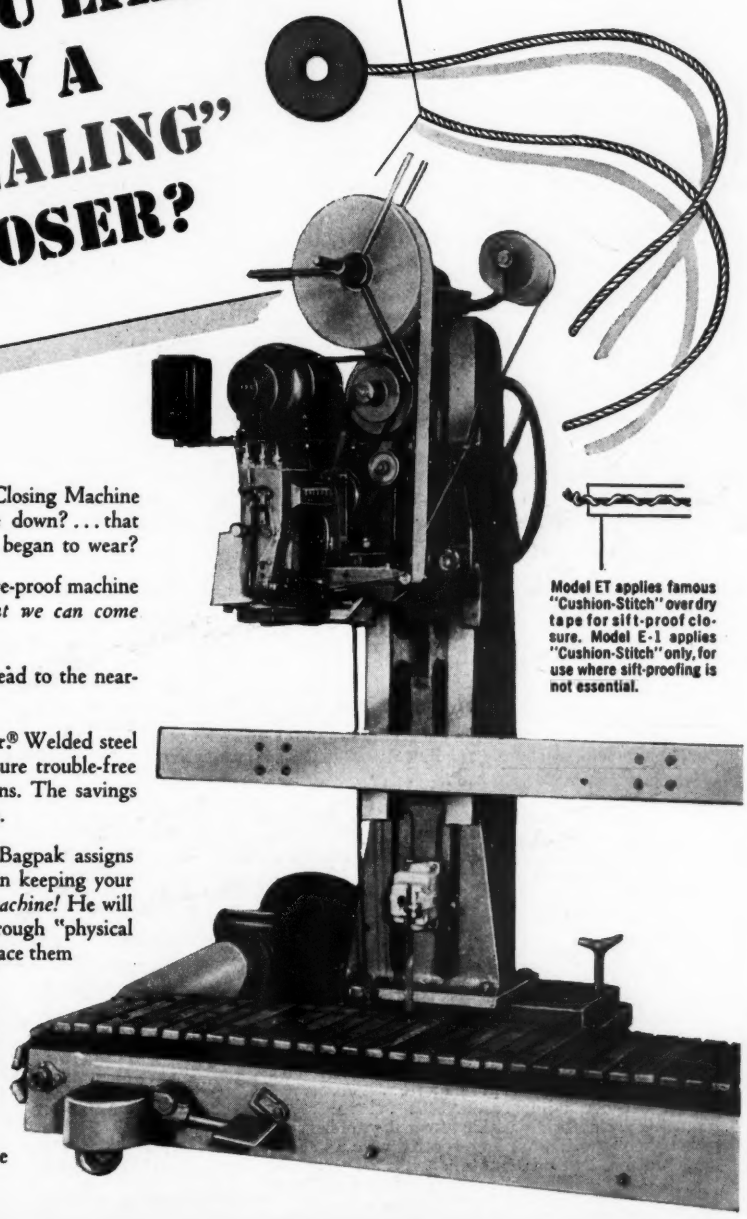
Anhydrous ammonia increased corn yields to a greater extent than ammonium nitrate. Tests showed the advisability of placing nitrogen deep when applied as a side dressing as summer approaches. December applications stimulated weed and grass growth and nitrogen efficiency was low.

Tests suggested that nitrogen used on pastures should be applied by the middle of June. Grasses responded about two weeks earlier with ammonium nitrate, but growth was more uniform where anhydrous ammonia was used. Little difference in grass production was noted. Results were about the same with the ammonia when applied at either a 16 or a 32-inch spacing.

Anhydrous ammonia, ammonium nitrate, and nitrate of soda were tested on several truck crops. Applying all of the ammonia before planting was as effective as split sources of any source.

Applied to tomatoes six inches deep in two applications the ammonia *(Continued on page 42)*

WOULD YOU LIKE TO BUY A "SELF-HEALING" BAG CLOSER?



Model ET applies famous "Cushion-Stitch" over dry tape for sift-proof closure. Model E-1 applies "Cushion-Stitch" only, for use where sift-proofing is not essential.

Would you like to have a Bag Closing Machine that never got out of order? . . . never broke down? . . . that would automatically "heal itself" if any parts began to wear?

Of course you would. A wear-immune and failure-proof machine is the ideal. We never quite achieve it — *but we can come mighty close!*

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First, extra strength is built into every Bagpaker® Welded steel construction and heavy-duty working parts assure trouble-free operation — reduce lost time due to breakdowns. The savings on this alone can be tremendous over the years.

Second — and perhaps the most important — Bagpak assigns an experienced Service Engineer to assist you in keeping your Bagpaker in tip-top shape, *for the life of the machine!* He will make regular visits to give the machine a thorough "physical check-up" . . . to look for wearing parts and replace them *before* they can cause a breakdown.

This kind of "preventive service", in addition to the extra serviceability built into every part of every Bagpaker, makes the Bagpak Machine the nearest thing to the ideal Bag Closing Machine you can possibly buy.

For more details about the *better* Bagpaker, write today for booklet 250-A.

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U. S. Rubber Company Introduces

A New Miticide: Aramite-15W

HOW TO CONTROL mites is a problem that is gaining increasing attention among fruit growers, nurserymen and home owners who want to improve the quality and quantity of their fruit, nursery stock and shade trees.

The mite population of the United States has grown rapidly during recent years. It is more than coincidence that the increase in mites has paralleled the development and widespread use of organic insecticides such as DDT.

Here is what many scientists feel has happened:

Organic insecticides have done an excellent job as general pest-killers but they have not been too effective against mites. In addition they have killed many insects that are predatory on mites. With this balance of nature at least partially destroyed, mites have been able to propagate without hindrance.

Heavy infestations have been in the dry sections of the country and in most states during the hot, dry seasons of the year. Most serious problems have occurred with citrus fruit, apples, peaches, almonds, walnuts, cotton, alfalfa, clover, beans, nursery stock, shade trees of many varieties and evergreens.

TECHNICAL DATA
ARAMITE-15W

Use: Miticide on the fruits and vegetables named below, trees, and ornamentals.

Formulation: Dry wettable powder containing 15 per cent by weight 2-(p-tert-butylphenoxy) isopropyl 2-chloroethyl sulfite.

Summary of Test Data: Aramite-15W effective against active stages of the following mites.

1. Citrus bud mite
2. Citrus red mite (Purple mite)
3. Clover mite (Brown mite)
4. European red mite
5. Lewis mite
6. Pacific mite
7. Red spider mite on cotton
8. Six-spotted mite
9. Spruce mite
10. Two-spotted mite (including Parathion resistant variety)
11. Willamette mite

Recommended Dosages:

Grapefruit, lemons, oranges: Citrus red mite, Citrus bud mite, Six-spotted mite, Lewis mite ..... **2 lbs./100 gal. water**
Do not apply within seven days of harvest or first picking.

Apples, peaches: European red mite, Pacific mite and Two-spotted mite ..... **1½ lbs./100 gal. water**
Clover mite ..... **2 lbs./100 gal. water**
Do not apply within fifteen days of harvest.

Almonds, walnuts: Two-spotted mite ..... **2 lbs./100 gal. water**

Cotton: Red spider mite ..... **2½ lbs./acre**

Nursery stock, shade trees: European red mite, Spruce mite and Two-spotted mite ..... **1½ lbs./100 gal. water**

Beans, dry edible and lima: Two-spotted mite .... **1½ lbs./100 gal. water**

Phytotoxicity: May cause slight burning of pears and is not recommended for use on this crop. No other phytotoxicity at recommended dosages has been observed.

Compatibility: Compatible with nicotine sulfate, toxaphene, lead arsenate, Phygon-XL, ferbam, and wettable powders of DDT, chlordane, and BHC. Gives satisfactory initial control with sulfur, but length of residual effectiveness may be decreased, with no accompanying phytotoxicity. Not compatible with lime or Bordeaux.

Toxicity: Oral LD_{50} to rats and guinea pigs is 3.9 grams per kilogram per body weight for the active ingredient. No accumulation of Aramite in tissues of animals in extended chronic feeding studies occurred. No irritation to skin results from contact.

Availability: On the market this year.

In most cases mites attack the foliage and heavy defoliation occurs with severe infestations. On apples, for example, it means small, poor quality fruit. In the case of citrus, mites are liable to attack the fruit directly with heavy loss.

Now, the Naugatuck Chemical division, United States Rubber Company, has developed a new chemical—on the market this year—which may well be the answer to the mite problem in most sections of the country and the beautiful part about it is that this chemical is relatively non-toxic to warm blooded animals.

The chemical name for the miticide is 2-(p tert butylphenoxy) isopropyl 2-chloroethyl sulfite. It is being sold, however, under the trade name Aramite. A dry wettable powder containing 15 per cent by weight of this chemical will be available this season through agricultural chemical distributors as Aramite-15W.

Field tests have been conducted in numerous agricultural experiment stations throughout the 48 states. Test results have been excellent in the control of the citrus bud mite, citrus red mite, European red mite, clover mites, Lewis mite, Pacific mite, red spider mite on cotton, six-spotted mite, spruce mite, two-spotted mite including the Parathion resistant variety, and the Willamette mite.

A big advantage of the chemical is the fact that it has little or no effect on mite predators at the recommended dosages. Its residual effect has been good with the possible exception of Florida and the company has added a stabilizer to the chemical which may solve this problem for that section of the country.

Particularly noteworthy has been the work of the California Citrus Experiment Station at Riverside, Calif., where Aramite was found highly effective on the various mites attacking oranges, grapefruit and lemons. Residual effect of two months or more—in some cases 70 or 80 days was noted.

The Washington Agricultural Experiment Station at Prosser, Wash., tested Aramite for control of mites on alfalfa and clover with good results and found that it had no effect on bees doing the yeoman work of pollinization.

Investigations in the control of deciduous fruit insects and mites in southern California showed that Aramite had good control of two-spotted and European red mite on apples, clover mite on apples and two-spotted mite on pears. Most effective control was obtained at 1.5 lbs. of Aramite-15W to 100 gallons.

Orchard control experiments in western New York state showed that Aramite was effective in controlling European red mite on apples at a dosage of one pound per 100 gallons plus three pounds of lead arsenate and five pounds of hydrated lime. It gave 91.9 per cent control in two days and 58.8 per cent control after nine days. Use of hydrated lime caused a chemical breakdown of Aramite and resultant loss of residual effect. Consequently the new chemical is not considered compatible with hydrated lime.

In eastern New York state the chemical was applied at a dosage of one pound per 100 gallons four times during the last season and gave good control of two-spotted mite on apples.

CONNECTICUT laboratory tests showed that Aramite-15W applied at one-eighth pound per 100 gallons of water gave 94 per cent and 88 per cent control of Parathion resistant mites in 24-hour readings. Higher concentrations were more effective.

In Maryland sprays utilizing one pound of Aramite-15W in 100 gallons of water killed resistant mites on roses and beans with good results but lower dosages were only partially effective. An aerosol containing five per cent Aramite was effective against non-resistant mites but not against resistant mites.

Aramite showed great promise in California tests on all species of mites on deciduous fruits and grapes. Good results were obtained in killing adult mites with excellent residual value. It was effective against two-spot and European red mites last season on apples and pears, and on Pacific mites on grapes and peaches. Dosages varied from 1 to 2 pounds Aramite-15W per 100 gallons and showed no toxicity to humans at these dosages.

Other California tests established dosages of as low as 15 pounds of Aramite-15W per acre with adequate control of citrus red mites. Two pounds per 100 gallons was effective against citrus bud mites. It also proved to be extremely effective for control of six-spotted and Lewis mites but was less effective than sulfur on citrus rust mite.

To date, the chemical has been applied by spray duster, speed sprayer, hand sprayers, boom applicators and by helicopter with effective control. Injuries to fruit and trees are rare.

Aramite is compatible with nicotine sulfate, toxaphene, lead arsenate, Phygon-XL, ferbam, and wettable powders of DDT, chlordane and benzene hexachloride. Its use with sulfur gives satisfactory initial control but may decrease the length of residual effectiveness. (There is no accompanying phytotoxicity.) It is not compatible with lime or Bordeaux mixture, however.

Acute toxicity tests have been made with Aramite with these results: Oral LD 50 to rats and guinea pigs is 3.9 grams per kilogram per body weight for the active ingredient. No accumulation of Aramite in tissues of animals in extended feeding studies occurred. No irritation to skin resulted from contact with the chemical. *(Continued on page 24)*

Photos by United States Rubber Co.

Dr. H. Douglas Tate, chief of Naugatuck Chemical's agricultural laboratories and R. John Zukel show bean tests on mites to Milton Carleton, writer and lecturer on agricultural chemicals.

This apple branch was sprayed for control of the European red mite. One pound of Aramite per 100 gallons of water was the dosage used.

Acids cause decomposition of Aramite. In formulating with materials known to release HCL, such as toxaphene, chlordane, DDT or BHC, it is suggested that additional propylene oxide or other suitable stabilizer be added.

Wettable powders should be stored in paper containers only, since decomposition will occur if placed in air tight tin-lined containers at high temperatures.

Dosages which are being recommended by Naugatuck Chemical are as follows:

1. **Grapefruit, Lemons and Oranges**
For citrus red mite, citrus bud mite, six-spotted mite and Lewis mite—2 lbs. per 100 gallons of water; should not be applied within seven days of harvesting or first picking.

2. **Apples, Peaches**
For European red mite, Pacific mite and two-spotted mite—1.5 lbs. to 100 gallons of water. For Clover mite 2 lbs. to 100 gallons. The chemical should not be applied within 15 days of harvest.

3. **Almonds, Walnuts**
For two-spotted mite—2 lbs. per 100 gallons.

4. **Cotton**
For red spider mite—2¼ lbs. per acre.

5. **Nursery Stock, Shade Trees**
For European red mite, spruce mite and two-spotted mite—1.5 lbs. per 100 gallons.

6. **Beans, Dry Edible and Lima**
For two-spotted mite—1.5 lbs. per 100 gallons.

Aramite-15W may cause slight burning of pears and is not recommended for this crop. No other phytotoxicity at recommended dosages has been observed. ◆

COMPATIBILITY

Aramite is compatible with the following pesticides and diluents without loss of effectiveness:

nicotine sulfate	wettable powders of—
Toxaphene	DDT
lead arsenate	BHC
Ferbam	Chlordane
Phygon—XL	pyrophyllite
talc	many clays

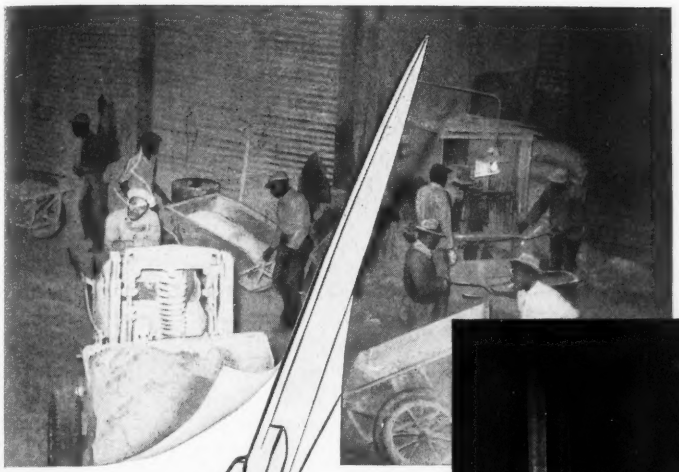
It should not be used with lime or Bordeaux mixture. Used with sulfur, the length of residual action is decreased but the initial control is not impaired.

SOLUBILITY

Aramite Technical is soluble in all proportions of the following solvents at room temperature:

methyl alcohol	petroleum ether
ethyl alcohol	kerosene
acetone	Sun Solvent 1547
benzene	Shell E407
xylene	Vesicol AR 60

The solubility in the paraffin hydrocarbons decreases rapidly with decreasing temperature. At 0°C. and −10°C. the solubility in "Deo-Base" is only 23.6 and 14.7 grams/100 grams solvent respectively. At −10°C. it is miscible in all proportions in ethyl alcohol and xylene.



IS THIS YOUR PLANT?

Obsolete batching methods formerly used in this plant accounted for the congestion and gross waste of man power shown by this unposed photograph.

THIS SACKETT ONE MAN BATCH-WEIGH SYSTEM

Cut operation costs 65%

In the plant pictured here, production cost tumbled 65% when the Sackett System replaced obsolete method formerly used.

CHALLENGE US TO DO AS WELL FOR YOU

You can be sure the estimated cost savings included with Sackett's Survey of your production operations will be met . . . or exceeded.

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America's Foremost Designers and Builders

SUPERPHOSPHATE PLANTS • FERTILIZER MIXING PLANTS • RELATED PRODUCTION EQUIPMENT

THE A. J. SACKETT & SONS CO., 1707 S. HIGHLAND AVENUE, BALTIMORE 24, MD.

Architects and Manufacturing Engineers to the Fertilizer Industry since 1897

Insecticides for Muckfarming

Leland G. Merrill, Jr., Ph.D.
Michigan State College

FROM THE initial use of DDT to the most recent application of the newest material, insect control on muck crops has been improved. We can now economically kill noxious pest insects such as the onion maggot and the onion thrips which in many places have never before been consistently controlled over a period of years.

Intelligent use of these newly developed insecticides is the key to their employment if we are to exploit all of the benefits which can be derived from their development. Plant injury, intolerable residues, abnormal plant growth effects, and flavor-tainting showed up following the indiscriminate use of certain of the new materials. These indications, among others, pointed to the fact that the new materials must be individually integrated into the family of pest control chemicals.

DDT, discovered in 1874 and developed as a pesticide in 1939, was the first of the new insecticides. This much-discussed chlorinated hydrocarbon compound is best used on muck specialty crops where a lasting residual effect is desired on plant parts which are not going to be used for food within several weeks following application. On a crop such as celery, which has a waxy corrugated surface, toxic DDT residues linger for weeks. Therefore, the use of DDT on celery is discouraged in Michigan.

As a broadcast soil surface treatment to control cutworms, DDT gives excellent control when timely treatments are made. In certain areas, specific cutworms are not checked by DDT but other hydrocarbons have done the job. A single application of a three per cent DDT dust about the fifteenth of July has nearly eliminated the mint flea beetle as a serious pest of mints in Michigan. These are only a few of the uses to which DDT has been put in muck farming. The accompanying chart gives other recommendations for chemical control of various insect pests of crops raised on muck soil.

DDT is available in numerous formulations, one for almost every conceivable use. In the agricultural line there are three, five, and ten per cent dusts; fifty and seventy-five per cent wettable powders, and water miscible emulsion concentrates at various strengths. Some formulators have combined DDT with other chemicals in special purpose mixtures such as DDT-chlordane mixtures. For some muck growers the dusts seem to be more practical, since the total weight of equipment is less, and growers encounter less difficulty in negotiating soft ground.

While most formulations of DDT contain the technical grade DDT, purified formulations of the para para' isomer, known popularly as aerosol-grade DDT, are available. The aerosol-grade DDT is somewhat less injurious to plant growth, and much objection to the use of DDT is thus overcome.

A close relative of DDT is methoxychlor. This chemical is the methoxy analog of DDT and differs but slightly in chemical composition from DDT. Fortunately, methoxychlor is less toxic to man and higher animals than is DDT. According to Arnold J. Lehman, writing in a bulletin of Association of Food and Drug Officials, methoxychlor is one of the safest insecticides because of its low toxicity. Likewise, upon DDT-sensitive plants such as the cucurbits, methoxychlor has been shown to be entirely safe for application against such pests as the cucumber beetles. Although somewhat less active in killing certain insects, against others methoxychlor is well suited for muck growers purposes.

Fertilizer placement drill used at the Michigan Agricultural Experiment Station Muck Experimental Farm. 1) Lever for regulating placement depth, 2) leveling roller, 3) sprocket rack, 4) top-delivery fertilizer-insecticide hoppers, 5) lever for adjusting spring tension on seeding unit press wheels. 6) self-driven seeding units, 7) clutch assembly for driving fertilizer-insecticide hoppers, 8) rate change sprocket assembly.

The gamma isomer of benzene hexachloride is marketed under the coined name of lindane. Prejudices against benzene hexachloride arising from the property of this chemical to impart off-flavors in bland vegetables mitigated strongly against the popularity of this excellent pest control material. Chemists have succeeded in isolating the nearly pure gamma isomer of benzene hexachloride. This chemical, lindane, has no appreciable odor and is said to have overcome the difficulty encountered in the application of the crude benzene hexachloride.

IN MICHIGAN, lindane has been used experimentally for soil infesting insect larvae and found active against seed-corn maggot.

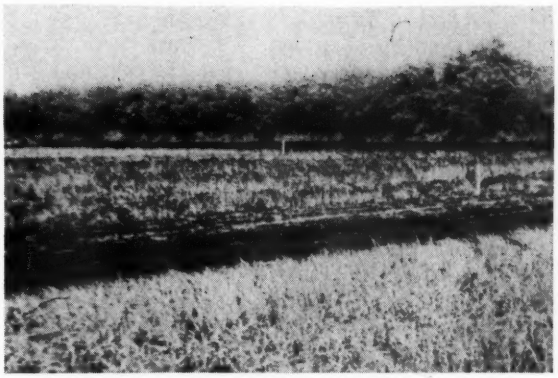
Chlordane is another chlorinated hydrocarbon insecticide. Unlike DDT which is non-volatile, chlordane has a fumigant as well as a rather lasting residual action. Where both a contact residual and fumigant poison action are desired, chlordane has been confirmed as an excellent insecticidal agent. For instance, a chemical agent was needed which would kill adult onion maggot flies and larvae by contact action, and which would also kill protected young larvae by fumigant action. This rather special requirement has been filled admirably by chlordane.

Work at the Michigan Agricultural Experiment Station in 1949 and 1950 indicated chlordane was the most efficient commercial onion thrips control material tested. Maggots in cabbage and radishes have been completely checked by chlordane applications. However, with chlordane as with DDT, any residue of the chemical is to be avoided upon edible portions of vegetables. Lehman classes it as presenting the greatest all around hazard of the commonly used chlorinated hydrocarbons.

Aldrin and dieldrin are chlorinated hydrocarbon insecticides which result from the chemical synthesis known as the Diels-Alder condensation. Said to be somewhat similar to chlordane chemically, these two materials have had wide experimental use. To this date, aldrin has found application in grasshopper baits and on cotton insects, whereas, dieldrin has been employed as a residual contact spray for fly control. In addition, dieldrin has been tested for thrips control, and our preliminary results in 1950 indicate that it is very promising in this respect, and we are continuing this work for 1951. Both materials have been tested in soil insect work, and dieldrin has been suggested by Howe and Schroeder in bean maggot control as a seed treatment. (*See February, 1951, American Fertilizer and Allied Chemicals.*)

A chlorinated camphene insecticide sold as toxaphene enjoys popularity with certain muck growers. Toxaphene has been used as an effective check on onion thrips, grasshoppers, and cutworms, all of which are important in parts of Michigan each year. Like DDT, toxaphene residues are of long life and are injurious to the foliage of some sensitive crops.

The organic phosphate insecticides have appeared somewhat more recently on the market than the chlorinated hydrocarbons. They differ from the hydrocarbon in that their acute toxicity is of a considerably higher order.



The onion planting in the foreground was dusted with Chlordane whereas the planting in the background received no pesticide. Yields from the dusted plot were 700 per cent greater than in the untreated, due to onion maggot infestation in the latter.

According to R. L. Webster, Washington Agricultural Experiment Stations, State College of Washington, the Germans during World War II were cut off from their sources of nicotine insecticides and worked out the organic phosphate materials which turned out to be more effective than the alkaloid nicotine itself. These organic phosphate insecticides are highly toxic to man and animals, and every precaution printed on the label by the manufacturer should be followed closely. Intelligent use of these chemicals must be adhered to in order to avoid the reoccurrence of reported toxic effects encountered by workers handling the material.

TETRA ETHYL pyrophosphate, known as TEPP, was the first of these insecticides to appear in muck farming. While it does not enjoy the widespread popularity of other compounds of this class, it does have certain specific uses, chiefly due to its high toxicity and very short residual action. This poor residual quality combined with its high insecticidal activity has made TEPP popular for applications where produce which is ready for market or processing becomes infested with aphids. Produce treated with TEPP is said to be ready for use within twenty-four hours with no danger from residues, since the quickly produced breakdown products of TEPP are of low toxicity to man.

The most prominent organic phosphate is parathion, a German discovery obtained after the close of World War II. For the purposes of the muck growers, parathion is invaluable for work where a relatively shorter term residual action combined with fumigation is desired.

Parathion is valuable for use on celery where DDT and other chlorinated hydrocarbons are apt to leave intolerable residues. The tarnished plant bug which seriously damages celery and reduces its yields in most areas of the country is well controlled by an application of 0.2 pound of parathion per acre. Parathion is effective against the aphids. On carrots a one per cent dust will do a very efficient job when used at fifty pounds per acre. Recent work carried on by J. R. Hoffman of the Michigan Experiment Station and by workers elsewhere has indicated that the con-

trol of carriers of certain virus diseases may be effectively checked by parathion. On muck crops of all types, virus diseases have been instrumental in lowering yields and quality of susceptible plants.

Aster yellows is a disease which is widely distributed in nature. For the prevention of yellows on head lettuce, in particular, but also on carrots and other virus susceptible crops, 0.2 pound of parathion per acre will effectively kill the six-spotted leafhopper, the vector of the virus. Weekly applications should be made to protect the vegetable up to within thirty days from harvest, which is the approximate incubation period of the disease in the plant.

METACIDE is a commercial phosphate insecticide containing six per cent parathion and 33.4 per cent of the dimethyl analog of parathion. The dimethyl analog of parathion is said to have an insecticidal strength equal to parathion but has a comparatively reduced contact toxicity to man and animals. From four to eight ounces of the metacide formulation per acre is recommended for control of aphids. The same precautions used with parathion should be followed when employing metacide.

The greatest complaint which is apparent at this time against the use of the new chlorinated hydrocarbon and the phosphate insecticides is their potential residue hazard upon edible plant parts. Fortunately, research has been carried in the direction of avoiding the residue hazard by developing insecticides which are relatively non-toxic to man and the higher animals.

Pyrethrum and rotenone were known for some time to have these properties. Price has at times worked against the popularity of these insecticides, but recently two approaches have been taken to overcome this drawback. In the first case an effort has been made to synthesize chemicals which are closely related to pyrethrum flowers' active ingredients. In the past two years such a material has been developed and is known as allethrin. Allethrin is said to be the allyl homologue of Cinerin I, one of the four active principles in pyrethrum insecticides. Although allethrin is closely related to the pyrethrins, no claims have been made as to its ability to displace the pyrethrins.

If further results uncover additional cheaply synthesized compounds of very low toxicity to man and higher animals with a high toxicity to insects, the industry will benefit greatly. For instance, the celery leaf tier, which is often a serious pest of celery, appears at or shortly before harvest. If a relatively non-toxic, inexpensive, pyrethrin-like material can be developed, then more economical applications of the chemical can be made right up to harvest time and not violate pure food and drug regulations.

A SECOND approach to this problem has been the development of synergistic and activator additive materials which in themselves are not spectacularly insecticidal but which increase the effectiveness of known desirable, relatively non-toxic botanical materials. Some of these synergists have been used with rotenone, pyrethrins, and with combinations of both rotenone and pyrethrins. A mixture of pyrethrins, rotenone, and the synergist piperonyl cyclonene marketed as CPR has been widely distributed and used. The most attractive claim for CPR is that the cost of application of the botanical materials has been thus reduced.

The most recent new endeavor toward killing insects by chemical means is to employ the so-called systemic insecticides. The systemic insecticides are chemical poisons which are applied to the plant through the seed, roots, or through the leaves and are then translocated throughout the plant. Insects which then feed upon the plant, suck in the plant juices and receive a lethal dose of the translocated toxic agent.

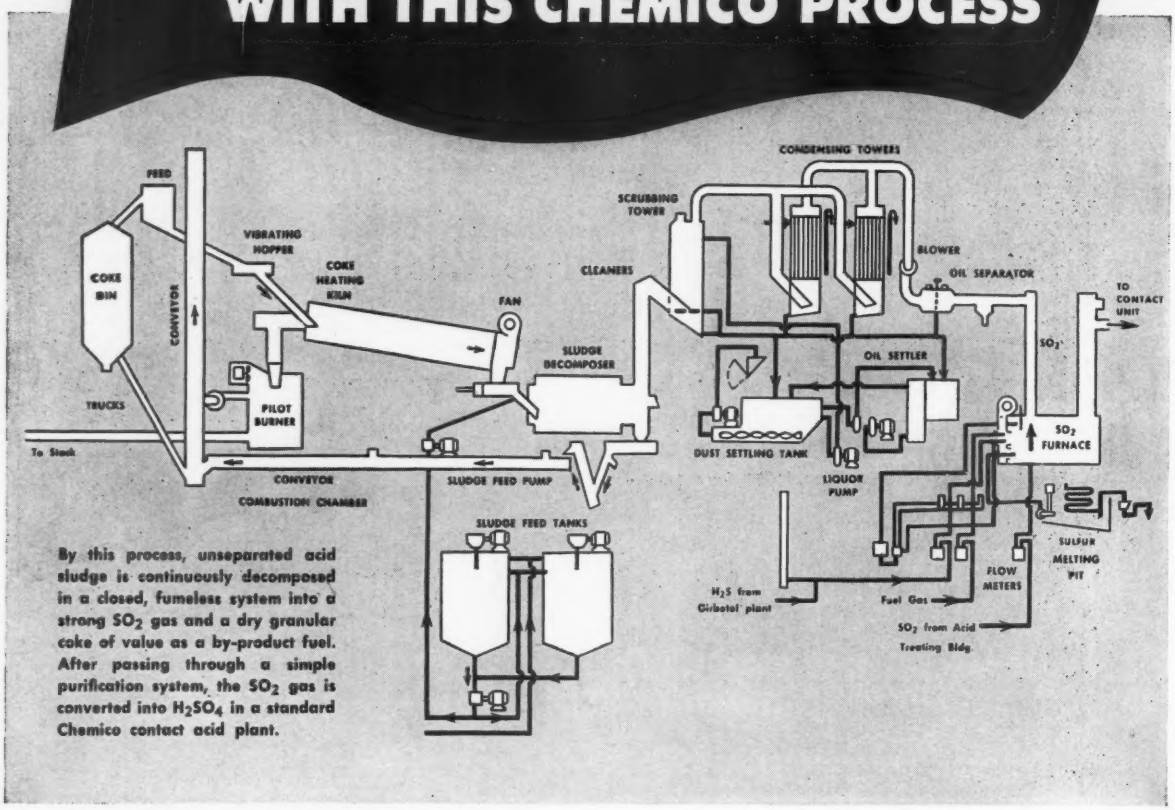
This toxic agent may or may not be the original insecticide. In some cases the original insecticide is broken down by metabolic processes within the plant, and the metabolite acts as the toxic principle. This principle of killing insects by translocated chemicals is not new. Selenium has been known for some time as a toxic systemic *(Continued on page 35)*

SOME SUGGESTED USES FOR NEW INSECTICIDES TO PROTECT MUCK CROPS

CROP	INSECT	CHEMICAL	REMARKS
Cabbage Cauliflower	**Aphids**	**TEPP Parathion**	Spray or dust. When du ing, a 25 ft. trailer or cur tain of cloth aids.
Cabbage Cauliflower	**Maggots**	**Chlordane**	Treat plants with dust or suspension when set out.
Carrots	**Leafhopper (yellows)**	**DDT**	1 - 1.5 lbs. per acre timed t meet leafhopper migratio from grain. Repeat at 1 day intervals.
Celery	**Tarnished Plant Bug**	**Parathion**	0.2 lb. per acre when plan are set out will increase yields and reduce strippi at harvest.
Grasshoppers		**Toxaphene**	2 lbs. dust per acre broad cast, 1.5 lbs. in spray per acre broadcast.
Head Lettuce	**Leafhopper (yellows)**	**Parathion**	0.2 lb. per acre at the time setting out plants. Repea weekly to within 30 days of harvest.
Onion (bulb)	**Maggot**	**Chlordane**	1 - 1.5 lb. per acre when plants are 2 in. tall. Re peat 2–4 times at weekly intervals to cover egg lay ing period.
Onion (bulb)	**Thrips**	**Parathion Chlordane**	0.5 lbs. per acre. 1 – 1.5 lbs. per acre. First applic tions timed to meet early infestation
Spearmint Peppermint	**Flea Beetle**	**DDT**	1 – 1.5 lb. per acre to meet adult emergence about Ju 15 (in Michigan).
Spinach	**Aphids**	**TEPP**	No residue hazard.
Sugar Beet Cabbage	**Cutworms**	**DDT Toxaphene**	1.5 lbs. per acre broadcast. 2 lbs. per acre broadcast.
Sugar beet	**Flea Beetle**	**DDT**	0.75 – 1.0 lbs. per acre.

Make Sulfuric Acid from Refinery Sludge

WITH THIS CHEMICO PROCESS



By this process, unseparated acid sludge is continuously decomposed in a closed, fumeless system into a strong SO_2 gas and a dry granular coke of value as a by-product fuel. After passing through a simple purification system, the SO_2 gas is converted into H_2SO_4 in a standard Chemico contact acid plant.

With the increasing shortage of raw sulfur, industry is turning to other materials which can be used for making much-needed sulfuric acid. An important source—waste oil refinery sludge—can be converted into clean sulfuric acid of any desired strength by the Chemico process shown in the flow diagram.

This proved and practical process offers three important advantages. (1) The purified SO_2 gas provides a product acid that is free of carbon contamination. (2) The resulting H_2SO_4 may be 98% or any higher strength regardless of the initial strength of the sludge. (3) Sludges that cannot be processed by other methods may be satisfactorily used in this system.

CHEMICAL CONSTRUCTION CORPORATION

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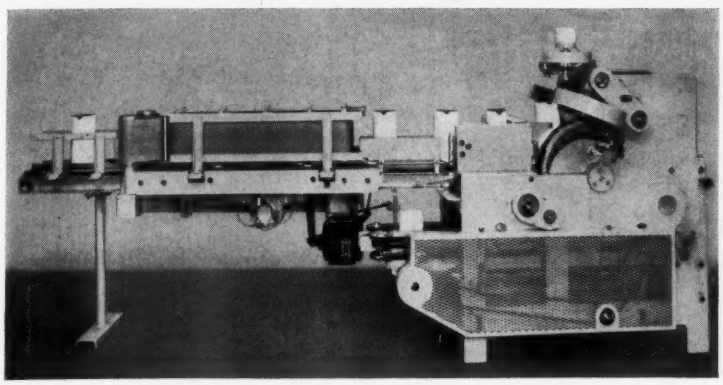
Chemico plants are profitable investments

Industrial News

New Products *New Plants* *New Appointments*

Bemis Bag Closing Machine



Deltaseal machine closes cellophane or kraft bags.

BEMIS BROS. Bag Company has brought out a new bag closing machine. The Deltaseal Closing Machine is unique in that it closes filled cellophane bags in one, two, and three pound weights, and two or three pound kraft paper bags.

With bag supplies uncertain the company believes that the handling of cellophane containers is especially important. They claim that this machine features one of the few methods devised for easy opening of filled cellophane packages

Fully automatic and requiring only a small amount of floor space the machine consists of a shaker, the closing unit, and a conveyor that allows for drying time and transports the bags from the closing unit to the casing or baling station. Adhesives used insure tight closure of both plain and moisture proof cellophane.

Machines now in use are closing 60 to 70 bags per minute according to the company. The unit may be changed to handle different sized packages in 30 to 60 minutes. AF & AC will see that you get more information, upon written request.

Scoop-Shovel for Yale Fork Trucks

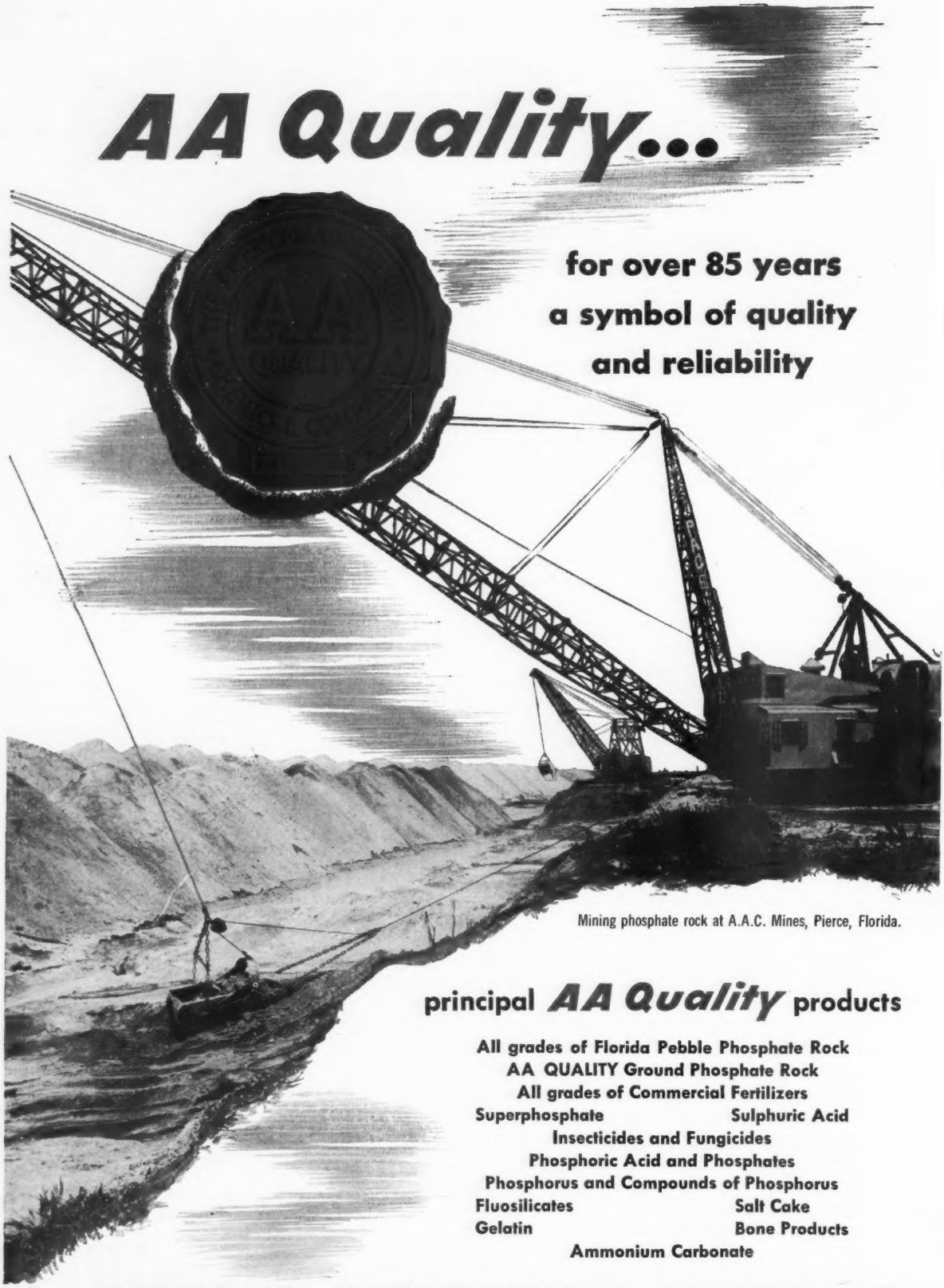
A hydraulically operated Scoop-Shovel has been added to the line of interchangeable devices available for use on Yale & Towne fork trucks.

Handling up to 26 cu. ft. of material the scoop tilts upward from the horizontal scooping position to cradle the load during transportation, and tilts downward to discharge the load when dumping.

Yale Scoop-Shovel

Further information on the Scoop-Shovel and other Yale fork truck devices is available upon request to AMERICAN FERTILIZER AND ALLIED CHEMICALS.

AA Quality...



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AA QUALITY Ground Phosphate Rock
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Superphosphate — Sulphuric Acid
Insecticides and Fungicides
Phosphoric Acid and Phosphates
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Gelatin — Bone Products
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The AMERICAN AGRICULTURAL CHEMICAL Co.

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Wanted: Kent Ring Roll Mill—To grind Florida Pebble Rock Phosphate, capacity 5 to 6 tons per hour, fineness 80 mesh or better, complete with air separator. Send full particulars to Green Valley Fertilizer & Chemical Co., Ltd., P. O. Box 140, New Westminster, B. C., Canada.

Wanted: Fertilizer Superintendent by old established Fertilizer Company in middle west, complete plant. Excellent opportunity for experienced man. Address "340" care AMERICAN FERTILIZER & ALLIED CHEMICALS, Phila, 7, Pa.

Ross Heavy Duty Mixer

Greater flexibility and versatility are reported for the Charles Ross and Son Company 41L Heavy Duty Kneader and Mixer. The company reports that actual production conditions have shown top performance where mixing and dispersing operations are combined.

The 41L is double-bladed with different stirrers available that may be used at the same or differential speeds. Manual, hydraulic or motorized tilting is possible and an optional two-speed motor expedites thinning. It is available in sizes up to 150-gallon capacity. Write AMERICAN FERTILIZER & ALLIED CHEMICALS for further information.

Tax Sales Down in February

Sales of tax tags increased 40 per cent in January, 1951, over the same period of 1950. A slight decrease was registered in February with 13 states reporting when sales dropped off three per cent from February of last year. At a new high last year, sales of tags representing 1,528,442 tons of material were reported for January and 1,015,343 in February.

Figures reported here last month for January were changed by the addition of figures from North Carolina and Oklahoma who report 30 days after the end of the current month. Arkansas also gave a revised report upping their sales by the equivalent of 5,288 tons.

FERTILIZER TAX TAG SALES AND REPORTED SHIPMENTS
(IN EQUIVALENT SHORT TONS)
COMFILED BY THE NATIONAL FERTILIZER ASSOCIATION

State	February		January		July-January	
	1951	1950	1951	1950	1950–51	1949–50
N. Carolina	1....	1....	337,648	288,052	728,933	545,623
S. Carolina	159,195	198,660	188,934	157,950	497,145	358,094
Georgia	182,753	208,697	256,009	149,329	535,462	366,542
Florida	126,005	139,328	153,475	122,023	680,695	590,652
Alabama	162,242	110,261	56,425	41,839	283,439	207,356
Tennessee	56,769	26,895	21,132	16,084	140,650	117,127
Arkansas	41,894	24,649	40,282	16,915	116,215	84,333
Louisiana	40,465	36,958	43,161	19,631	117,388	76,075
Texas	52,410	67,888	61,480	40,354	317,589	256,003
Oklahoma	1....	1.. .	12,417	8,662	68,025	63,180
Total South	821,733	813,336	1,170,963	860,839	3,485,541	2,664,985
Indiana	76,665	73,822	127,610	98,375	623,774	503,794
Kentucky	60,635	96,961	94,782	57,415	302,545	223,462
Missouri	56,310	56,362	135,087	77,504	398,267	245,488
Total Midwest	193,610	227,145	357,479	233,294	1,324,586	972,744
Grand Total	1,015,343	1,040,481	1,528,442	1,094,133	4,810,127	3,637,729

Muckfarming . . .

(*from page 28*) agent in the control of the mites. Unfortunately, selenium is a highly toxic and persistent element. The new systemic materials, however, are of shorter duration, and their use may be possible upon edible crops which are grown on muck soil.

As yet, the use of the systemic insecticides upon muck crops is still in the experimental stage, but considerable work on this subject is being carried out, and possibly limited recommendations for employment of the systemics will be forthcoming within a short time. Two of the several systemic insecticides which are being tested are octamethyl phosphoramide, known as Pestox III, and Systox or E-1059.

Insecticidal treatment of soils, although not new, is another ramification of pest control into which the new chemicals have penetrated. Insecticides may be added to soils by various means. The insecticide may be sprayed or dusted on the soil surface, then worked into the desired depth. Fertilizers with insecticides added may be applied broadcast to the surface of the soil or applied in the row with various types of machinery.

The USDA, Bureau of Plant Industry, Soils and Agricultural Engineering, in cooperation with Michigan State College has developed recently a fertilizer placement drill designed for highly organic muck soils. The purpose of the drill is to place the fertilizer at various desired locations with regard to the seed. On onions we have mixed a few insecticides with fertilizer and applied it as mentioned in different locations with reference to the seed.

Thus far the more successful soil insecticidal treatments have been those largely confined to sandy soils where small amounts of insecticide will do the job. E. H. Floyd and his co-workers at Louisiana State University have described work of this type for killing soil insects. It is well known that whereas one pound of chlordane per acre may serve in a sandy soil to kill wire worms, 7.5 to 10 pounds may be required in muck soils which seem to absorb or inactivate so much of the material.

Seed treatment and the addition of an insecticide in the row have also been tried to control soil insects on muck. W. A. Rawlins and A. G. Newhall of the Cornell Department of Entomology have published results of work in which lindane or other insecticide together with a fungicide were blown into the open row by a duster at the time of seeding. Apparently, from their report, preliminary results were promising. The most hopeful aspect of this type of treatment is that if it proves able consistently to control the maggot, it will do away with the need for additional surface cover dustings.

Within the past seven or eight years, the use of farm chemicals by muck-farmers has increased manyfold. Prior to the advent of the new insecticides, crop failures or yield reductions were taken as hazards of the industry or as calculated risks. Today, most of the worst pests can be sharply limited in their ravages on specialty muck crops by the new pest control chemicals. Industry's contributions have eliminated still more of the guesswork from agriculture. ◆

FERTILIZER MATERIALS MARKET

New York

April 6, 1951

Sulphate of Ammonia

This material was definitely hard to buy for quick shipment, with leading producers sold out and only shipping against existing contracts. There was some export demand but little material offered. No price changes were noted.

Nitrate of Soda

This material was reported moving well in a number of directions, particularly in the South.

Ammonium Nitrate

The demand for this material was reported as easing slightly because the season is over in certain areas for this material. However, demand from other areas continue and producers are being pressed to get the material out in time for this season's use.

Nitrogenous Tankage

This is another material that is critically short at the present time because of lower production.

Castor Pomace

With production limited, no supplies were available except against previous orders, with last sales made on the basis of $5.50 per unit of ammonia ($6.68. per unit N), f.o.b. production point.

Organics

Most fertilizer organics were in short supply and demand continued heavy, with exception of certain materials also used by the feed trade which recently have shown an easier tendency. Vegetable meals such as soybean meal was easier in price and re-sale material dominated the market, with last sales for prompt shipment being made at $63.00 per ton in bulk, f.o.b. Decatur, Ill. Linseed meal was easier with last sales made at $66.00 per ton in bulk, f.o.b. Eastern points. Cottonseed meal was the only vegetable meal to show a steady tendency which was principally caused by lack of supplies. Tankage sold at $8.75 per unit of ammonia ($10.63 per unit N), f.o.b. Eastern points for prompt shipment, and blood sold at $9.00 per umit of ammonia ($10.94 per unit N).

Fish Meal

Sales have been reported made of new catch menhaden fish meal on a "when and if made basis" with no price stipulated, with the price to be fixed at time of shipment. Arrivals of foreign fish meal continue at various ports, with last sales made on the basis of $135.00 per ton for 60 per cent material.

Bone Meal

While no easing up in demand has been noted, supplies are slightly larger at some points and an increasing amount of foreign material has recently arrived.

Hoof Meal

This material continued in excellent demand and offerings were difficult to locate, with last sales made at $7.75 per unit of ammonia ($9.42 per unit N), f.o.b. Chicago.

Superphosphate

This material was definitely short and the situation is getting worse in most areas, with producers being forced to cut existing contracts back in accordance with their reduced production. This whole situation is attributed to lack of sulphur which in turn has affected sulphuric acid.

Potash

Some producers report a slight easing of the boxcar situation and are making shipments as fast as production will permit. Some recent foreign arrivals were noted but this material had all been sold previously. Demand continued excellent in all directions.

Philadelphia

April 6, 1951

The raw materials market remains quiet with the trade generally reconciled to the tight supply position existing in practically all articles. Most mixers could use additional supplies if obtainable but they show practically no interest in resale goods at a premium. These latter prices are due largely to additional freight and handling costs, and not to excessive profits. The scarcity of sulphuric acid continues to be very serious and lack of box-cars is causing further inconvenience.

Sulphate of Ammonia.—Produc-

tion is retarded by the scarcity of sulphuric acid and the supply position is very tight. Shipments have been delayed somewhat by box-car shortage. Output is practically all under contract and no new offerings are made.

Ammonium Nitrate.—Demand is very active and considerably ahead of production, which is all under contract. Deliveries are further delayed by shortage of cars and scarcity of bags.

Nitrate of Soda.—Supply is keeping up with the demand and shipments are arriving on schedule from Chile. However, there is said to be no accumulation of surplus stocks.

Blood, Tankage, Bone.—While there is no surplus of blood and tankage, the supply seems amply sufficient to meet requirements. Prices range from $9.00 to $9.50 per unit of ammonia ($10.94 to $11.55 per unit N). Bone meal continues in rather limited supply with quotations at $65.00 to $70.00 per ton depending on quality and location. Hoof meal is quoted at $7.75 per unit of ammonia ($9.42 per unit N), with the supply limited.

Castor Pomace.—None is being offered at present.

Fish Scrap.—Sales of spot menhaden meal have been reported at $145.00 per ton, and there is some trading in new catch on a "when and if" basis.

Phosphate Rock.—Supplies are ample to meet requirements, but shipments are cut back somewhat by reduced demand from acidulators.

Superphosphate.—Production is greatly reduced because of sulphuric acid shortage, and deliveries are all against standing contracts. No new business is offered and there is no resale in the market.

Potash.—Demand is active and supply position very tight. Production continues at capacity with movement entirely against contracts. Box-car situation is still troublesome, and bags scarce.

Charleston

April 5, 1951

With the demand for mixed fertilizers now quite heavy, all prime ingredients are in heavy demand also, maintaining supplies of nitrogen, superphosphate, and potash in tight market positions. Over-all supplies appear to be sufficient to cause no real hardships for farmers.

Organics.—Fertilizer grade organics generally are in firm market position with supplies limited and demand fair. Domestic nitrogenous tankage producers are for the most part sold up for this season with prices nominal at $3.50 to $6.00 per unit of ammonia ($4.25 to $7.29 per unit N), f.o.b. production point. A limited quantity of domestic process tankage was recently offered for April/May shipment at the $6.00 figure. Imported nitrogenous has been offered recently in very limited quantity at around $6.25 per unit of ammonia ($7.59 per unit N) in bags, c.i.f. usual Atlantic ports for summer shipment.

Castor Pomace.—Domestic supplies are sold up through June, 1951, with no offerings beyond that month. Price continues at $5.50 per unit of ammonia ($6.68 per unit N), bagged, f.o.b. northeastern shipping points for material guaranteed minimum 5.75 per cent ammonia. Imported lots in limited quantity appear from time to time for summer shipment at around $47.00 to $48.00 per ton, in bags, c.i.f. Atlantic ports.

Dried Ground Blood.—The Chicago market is quiet at around $9.25 to $9.35 per unit of ammonia ($11.24 to $11.36 per unit N) delivered the Chicago area. New York prices are around $9.25 to $9.50 ($11.24 to $11.55 per unit N).

Potash. — Demand continues quite active and shipments from domestic sources steady except for spasmodic car shortages which have interrupted shipping schedules somewhat. In the past two weeks some supplies of imported muriate have arrived at Atlantic ports. Heavy commitments through May 31 will eliminate the usual spot period material offered by the domestic producers.

Ground Cotton Bur Ash.—Supplies of this source of potash, primarily in the form of carbonate of potash, are available for prompt and April/June shipment, with analyses from some producers running rather consistently around 40 per cent K_2O.

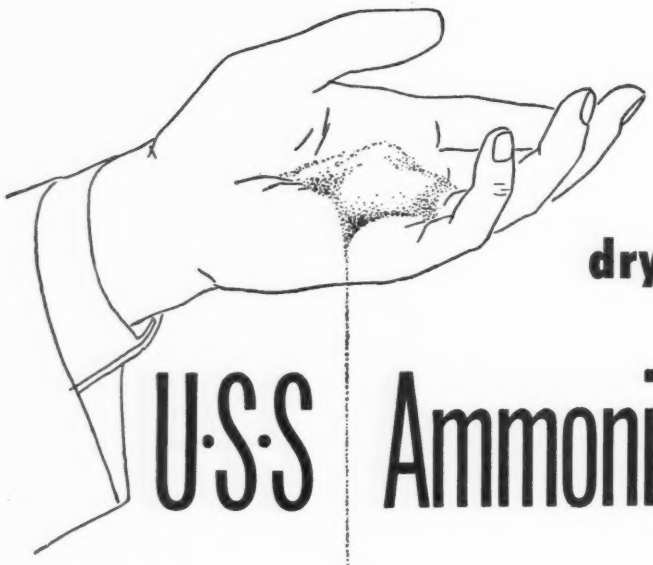
Phosphate Rock.—Movement to domestic acidulators is steady and stocks adequate. Volume depends on the supplies of sulphuric acid which have been reduced by the curtailment of shipments of sulphur

Superphosphate.—The market for all types of this material is definitely tight with prices seeking their highest ceilings. Triple superphosphate is particularly short of demand.

Sulphate of Ammonia.—Supplies tight and market at ceiling levels. No surplus in any part of the country.

Ammonium Nitrate.—Demand far in excess of supply. Market tight.

Nitrate of Soda.—Imported supplies are being allocated to fertilizer manufacturers, and production of domestic type has been stopped. Market exceedingly tight.



dry, free-running

U·S·S Ammonium Sulphate

stands up in storage

In bulk or in 100-lb. bags, U·S·S Ammonium Sulphate doesn't set in storage . . . doesn't get wet when exposed to air. It is dry and free-running . . . mixes easily with other complete fertilizer ingredients . . . isn't highly corrosive to drills or other distributing equipment.

U·S·S Ammonium Sulphate reduces your storage losses by its non-setting qualities when it is used in your high-analysis mixed fertilizers or handled in bags for direct application.

Supplies of U·S·S Ammonium Sulphate are somewhat shorter this spring than in the last few years. So anticipate your needs, both in bulk and in bags, and keep in touch with our nearest sales office. United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S AMMONIUM SULPHATE

UNITED STATES STEEL

Pesticide Labels . . .

(*from page 15*) or pets. One company put on the market a rat killer containing an arsenite and labeled it "Relatively Harmless to Domestic Animals." Of course in this case it depended on what you considered the killer relative to, but pity the poor cocker spaniel that took a bite of the stuff.

Any material that might damage crops should be declared. Give specific instructions if it's a tricky concoction and will defoliate a radish crop or put spots on a fruit grower's apple crop.

The Basic Rules

You can put all of this together and arrive at ten basic principles to follow when making a label for your pesticide.

1. Study the laws carefully.
2. Turn in correct registration papers, that agree with the product and make sure that your label agrees with it.
3. Match the ingredient statement, include all of the necessary information including the correct percentages, with a grand total of 100 per cent.
4. Don't leave anything to chance when instructions are compiled.
5. If you make any claims, be able to back them up with substantial proof and tests.
6. If it's a poison, say so on the label.
7. Put on the correct name, address and net weight.
8. Don't mention registration in any state on the label, it's illegal to do so.
9. Make the required matter as prominent as any design or statement you place on the label.
10. Check the laws of the states in which you intend to market once again and be sure that both your pesticide and its label will pass.

It will pay to double check in 1951 for the state legislatures are moving and some have already clamped down to some extent. In Minnesota, the new Economic Poisons and Devices Law will be really backed up for the first time in 1951, with inspectors and chemists available to carry out its provisions. Officials lacked funds to enforce the Mississippi Economic Poisons Law in 1950 but expect that they will be able to be much stricter this year.

Determine where you are going to manufacture or market a product and learn the regulations you will have to abide by. Try to pick out the most stringent and follow them implicitly. At least you will be assured of hitting a maximum of the state laws above the belt and will avoid a lot of possible trouble. Remember that a bad label can get you into trouble regardless of the quality of your product.

If you are thinking of entering the pesticide field inform yourself of the regulations. The AMERICAN FERTILIZER & ALLIED CHEMICALS magazine will be glad to send you, upon request, the name and address of the enforcing agency or officer of any state in which you are interested. ◆

Tracto-Loader Features New Drive and Transmission

The Tracto-Loader manufactured by the Tractomotive Corporation features a hydraulic torque converter drive and a new Design clutch type transmission.

According to the manufacturer the new transmission eliminates most gear shifting.

New Tracto-Loader

Mounted on rubber tires, the loader has a ¾ cu. yd. capacity and weighs 10,650 lbs. Power is furnished by an Allis-Chalmers 40.5 brake H.P. gasoline engine. Write AMERICAN FERTILIZER AND ALLIED CHEMICALS if more data is desired.

Bottled Fertilizer . . .

(*from page 20*) was equal to the other sources of nitrogen. Both anhydrous ammonia and ammonium nitrate were significantly better than the nitrate of soda when used on beans.

So far data obtained has shown that there is little difference between the three sources used in these tests on most truck crops. As yet, there is not sufficient data to give specific recommendations.

Experiments carried out by the Texas Experiment Station during 1950 indicated that the anhydrous ammonia can be used profitably on the Grand Prarie soils of Central Texas. The results were not considered conclusive but showed that its use could be profitable.

Several other experiment stations have been carrying out field tests with anhydrous ammonia and it is expected that more specific information and recommendations will be available soon. With the interest that has been aroused by the few experiments already carried out it is probable that farmers will insist on release of more data providing an impetus for the experiment station researchers.

Offers Custom Service Prospects

Since its first use as a fertilizer in 1943, the use of anhydrous ammonia has spread rapidly. At the end of the 1949 season it was being used in 31 states and in Mexico and Cuba. Bulk plants have been erected throughout the country and installations are operating in 17 states.

There are a number of large farmers who prefer to hire a custom applicator to apply anhydrous ammonia even though the cost is more than if they aplied it themselves. The difference is that the custom operator adds power and labor to that available on the farm at a time when power and labor are at a premium. There is one disadvantage—the custom applicator may not always be able to put out anhydrous ammonia at the time maximum response would be obtained. This may also be true where a farmer does his own work.

Particularly where custom application is practiced, the application of phosphorus or potash, or a mixture of the two at the same time anhydrous ammonia is applied, offers an opportunity for considerable savings in the cost of fertilizers applied to the land. The greatest opportunity for the custom applicator is in areas where a variety of crops are planted, which gives a longer application period.

Where the fertilizer application period is short, it is more difficult to make a profitable business out of custom application.

Since farmers first started using anhydrous ammonia in 1947, the practice is still in its infancy, and the possibilities of its use have not yet been fully realized.

Although much of the available test data is, as yet, inconclusive, it looks like fertilization with anhydrous ammonia will soon be a profitable business. The development of the domestic synthetic ammonia industry has been termed an "outstanding example of applied research" by Dr. Robert M. Salter, Plant Industry Chief, USDA. ◆

BUYERS' GUIDE • Classified Index to Advertisers in "American Fertilizer & Allied Chemicals"

AGRICULTURAL CONSULTANTS
Bailey & Lerch, Washington, D. C.

AMMONIA—Anhydrous and Liquor
Barrett Div., Allied Chemical & Dye Corp., New York City
Commercial Solvents Corp., New York City
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

BAG MANUFACTURERS—Burlap
Bemis Bros. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAG MANUFACTURERS—Paper
Bemis Bro. Bag Co., St. Louis, Mo.
International Paper Co., Bagpak Div., New York City
Hammond Bag & Paper Co., Wellsburg, W. Va.
Jaite Company, The, Jaite, Ohio
Kraft Bag Corporation, New York City
Mente & Co., Inc., New Orleans, La.
Raymond Bag Co., Middletown, Ohio
Virginia-Carolina Chemical Corp., Richmond, Va.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES
International Paper Co., Bagpak Div., New York City

BAG PRINTING MACHINES
Schmutz Mfg., Louisville, Ky.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

BONE PRODUCTS—Bone Black
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
McIver & Son, Alex M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—For Hoists, Cranes, etc.
Hayward Company, The, New York City

BUCKETS—Elevator
Baughman Manufacturing Co., Jerseyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

CARS AND CART
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind.

CASTOR POMACE
McIver & Son, Alex. M., Charleston, S. C.

CHEMICALS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Barrett Div., Allied Chemical & Dye Corp., New York City
Commercial Solvents Corp., New York City
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Koppers Company, Inc., Tar Products Div., Pittsburgh, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.
United States Steel Corp., New York City
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

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Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

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Jackle, Frank R., New York City
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National Lime & Stone Co., Findlay, Ohio
Quakers Oats Company, Chicago, Ill.

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McIver & Son, Alex. M., Charleston, S. C.

DRYERS
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City
Marietta Concrete Corporation, Marietta, Ohio
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation, Nicolay, New York City

FERTILIZER (Mixed) MANUFACTURERS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
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International Minerals & Chemical Corporation, Chicago, Ill.
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Virginia-Carolina Chemical Corp., Richmond, Va.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
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McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

HOPPERS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES
American Agricultural Chemical Co., New York City
Kolker Chemical Works, Newark, N. J.

LIMESTONE
American Agricultural Chemical Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

LOADERS—Car and Wagon
Hough Co., The Frank G., Libertyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making and Handling
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Ammoniating
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

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MACHINERY—Material Handling
Atlanta Utility Works, The, East Point, Ga.
Hayward Company, The, New York City
Hough Co., The Frank G., Libertyville, Ill.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Mixing, Screening and Bagging
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Power Transmission
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Superphosphate Manufacturing
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.

MINOR ELEMENTS
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

NITRATE OF SODA
American Agrictultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Barrett Div., Allied Chemical & Dye Corp., New York City
International Minerals & Chemicals Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.

NITROGEN SOLUTIONS
Barrett Div., Allied Chemical & Dye Corp., New York City
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGENOUS ORGANIC MATERIAL
American Agriculture Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Virginia-Carolina Chemical Corp., Richmond, Va.

PLANT CONSTRUCTION—Fertilizer and Acid
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monsanto Chemical Co., St. Louis, Mo.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.

POTASH SALTS—Manufacturers
American Potash and Chemical Corp., New York City
Potash Co. of America, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
United States Potash Co., New York City

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Bagging
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

STORAGE BUILDINGS
Marietta Concrete Corporation, Marietta, Ohio

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
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Barrett Div., Allied Chemical & Dye Corp., New York City
Jackle, Frank R., New York City
Koppers Co., Inc., Tar Products Div., Pittsburgh, Pa.
Lion Oil Co., El Dorado, Ark.
McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
United States Steel Corp., New York City
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SULPHATE OF POTASH—MAGNESIA
International Minerals & Chemicals Corporation, Chicago, Ill.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City

SULPHURIC ACID
American Agricultural Chemical Co., New York City
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Ashcraft-Wilkinson Co., Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
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Southern States Phosphate Fertilizer Co., Savannah, Ga.
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SUPERPHOSPHATE
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Southern States Phosphate Fertilizer Co., Savannah, Ga.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
U.S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

TANKAGE
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

VALVES
Atlanta Utility Works, The, East Point, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

WEED KILLERS
Kolker Chemical Works, Newark, N.J.

Alphabetical List of Advertisers

First Southwest DDT Unit

KOLKER Chemical Works, Inc., of Newark, N. J., have announced completion of a new DDT unit at their Houston, Texas, plant. This is the first DDT producing plant in the Southwest, and is Kolker's second—the other being located at Newark.

New Plant at Houston

Houston was chosen as the location of the Kolker plant because the necessary raw materials are produced in the immediate area, and because the finished DDT could be placed in the hands of insecticide manufacturers within hours from time of shipment —resulting in much faster and more economical deliveries to the ultimate consumer. For cotton farmers particularly, the new DDT production, together with Kolker's BHC unit (already in production) mean substantially larger supplies of the popular cotton insecticides "3–5–0" and "3–5–40" formulations. For industry, the new plant also means larger supplies of muriatic acid and spent sulfuric acid—by-products of the manufacturing process.

The completion of the DDT unit marks the second step in Kolker's current expansion, now in progress at their 48-acre Houston site. A number of new organic chemicals for industry and agriculture are now being developed for future production there.

1950 Cotton Insect Damage High

State	*Indicated Production Oct. 1 1950 (Bales)*	*Estimated Reduction from Full Yield Caused by Insects (Per cent)*	*Estimated Number Bales Destroyed by Insects (Bales)*	*Estimated Value of Lint & Seed Destroyed by Insects (Dollars)*
Missouri	280,000	7	32,131	$ 7,614,245
Virginia	9,000	17	2,318	552,255
North Carolina	190,000	35	195,588	46,149,990
South Carolina	440,000	28	224,000	52,815,840
Georgia	545,000	27	241,230	56,796,405
Florida	14,000	20	4,308	1,021,995
Tennessee	460,000	13.5	98,571	23,166,135
Alabama	630,000	28	315,000	74,031,300
Mississippi	1,400,000	20	430,769	101,239,345
Arkansas	1,090,000	17	303,770	71,417,845
Louisiana	375,000	18.5	126,136	29,580,135
Oklahoma	190,000	17	87,297	20,449,955
Texas	2,775,000	11	455,597	107,035,650
New Mexico	190,000	3	6,477	1,512,915
Arizona	407,000	1	4,196	983,615
California	865,000	2	18,021	4,196,990
U.S. Total	9,860,000	16.5	2,545,409	$598,564,615

This is a preliminary unofficial estimate prepared by the National Cotton Council.

IMPORTANT NOTICE

On and after April 15th our General Sales Office will be located at the following new address

1625 EYE Street, N. W.
Washington 6, D. C.
Telephone: STERLING 4990

Our New York office will be discontinued as of the above date.

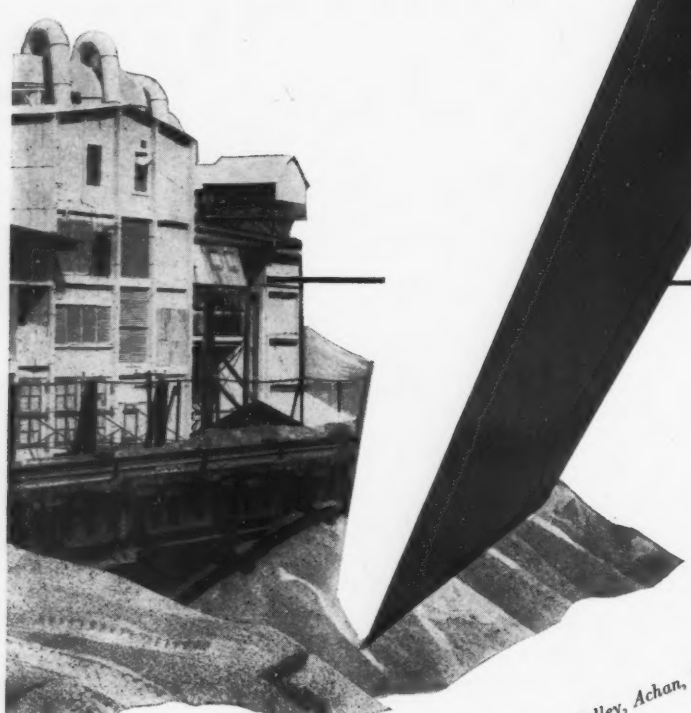
POTASH COMPANY OF AMERICA
Carlsbad, New Mexico

GENERAL SALES OFFICE . . . 50 Broadway, New York, N. Y.
MIDWESTERN SALES OFFICE . . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . . Candler Building, Atlanta, Ga.

high grade

INTERNATIONAL PHOSPHATES

All Commercial Grades Florida Pebble Phosphate, Tennessee Phosphate



Mines and Plants in Florida at Noralyn, Peace Valley, Achan, Mulberry; in Tennessee at Mt. Pleasant and Wales.

PHOSPHATE DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

General Offices: 20 North Wacker Drive, Chicago 6